THE IRON AGE

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Variety No Bar to Mass Production

Flexibility of Operations Enables Waukesha Motor Co. to Make Many Types of Gas Engines at Prices Reflecting Quantity Output

"HENRY FORD is properly recognized as the world's greatest manufacturer. By making his overhead carry a tremendous volume of output, he has outdistanced all rivals in reducing unit costs," said Harry L. Horning, president and general manager of the Waukesha Motor Co., Waukesha, Wis., when interviewed by a representative of THE IRON AGE.

"Yet it is equally true that other manufacturers are performing certain operations more efficiently. This fact is not altered by a comparison of costs, since a much larger volume of repetitive work still throws the advantage in Ford's favor.

"The principle of making a given overhead carry a maximum amount of production, developed in such an impressive manner in the automobile field, is a standing challenge to all American manufacturers. It is not surprising that some industrial executives have succeeded in making up, in part, for restricted volume by developing more efficient methods of doing specific things.

"Every manufacturer now realizes the importance of volume to cost reduction and the equal importance, paradoxical as it may seem, of cost reduction as a prerequisite to greater volume. He is also well aware that the difficulties of obtaining an economical operation increase in direct proportion to the variety of products he makes. The greatest problem of the Waukesha Motor Co. is to achieve a flexibility that will permit it to serve many different classes of customers with numerous types of gas engines in small and large quantities—and at a price that reflects mass production.

"That we have succeeded in a measure is indicated by the fact that in our busiest season we are able to deliver within two days to six weeks after the receipt of an order for a specialized product. While we build 30 different models of engines and the specifications of our customers may call for numerous accessories and adaptations to meet their particular requirements, there is a sufficiently even flow of business in certain types of motors to permit the scheduling of 35 to 45 per cent of our production three to four months in advance. Around this nucleus the rest of our manufacturing program is built as actual orders are received.

"The nature of our business does not permit us to duplicate the automobile industry's straight-line flow of materials, with assembly of parts at fixed time intervals in step with continuous conveyors. Our scheme of assembling engines is designed to give us the best possible results considering the variety of models we make. Our

HARRY L. HORNING has long been a leading figure in the automotive industry. He was elected first vice-president of the Society of Automotive Engineers at the 1921 annual meeting, and in 1925 was elected president. He has also been president of the Motor and Accessory Manufacturers Association, serving in 1926 and 1927. During the war he was chairman of the automotive production section of the War Industries Board. Mr. Horning's first business connection, after attending Carroll College, Waukesha, Wis., was in the chemical laboratory and operating department of the Milwaukee Gas Light Co. in 1901. Later he spent two years in the steam engineering department of the Crane Co. From 1904 to 1906 he was head of the mechanical engineering department of the Modern Structural Steel Co., Waukesha. In 1906 he established the Waukesha Motor Co.

operations are departmentalized both as to parts and size of completed product.

"One end of the plant is devoted to building engines of more than 70 hp. Here four-cylinder engines ranging from 80 to 120 hp. are produced in uninterrupted progression, from the machining, drilling and honing of parts to their assembly into completed units, and six-cylinder motors ranging from 200 to 300 hp. are built up individually on a single assembly stand.

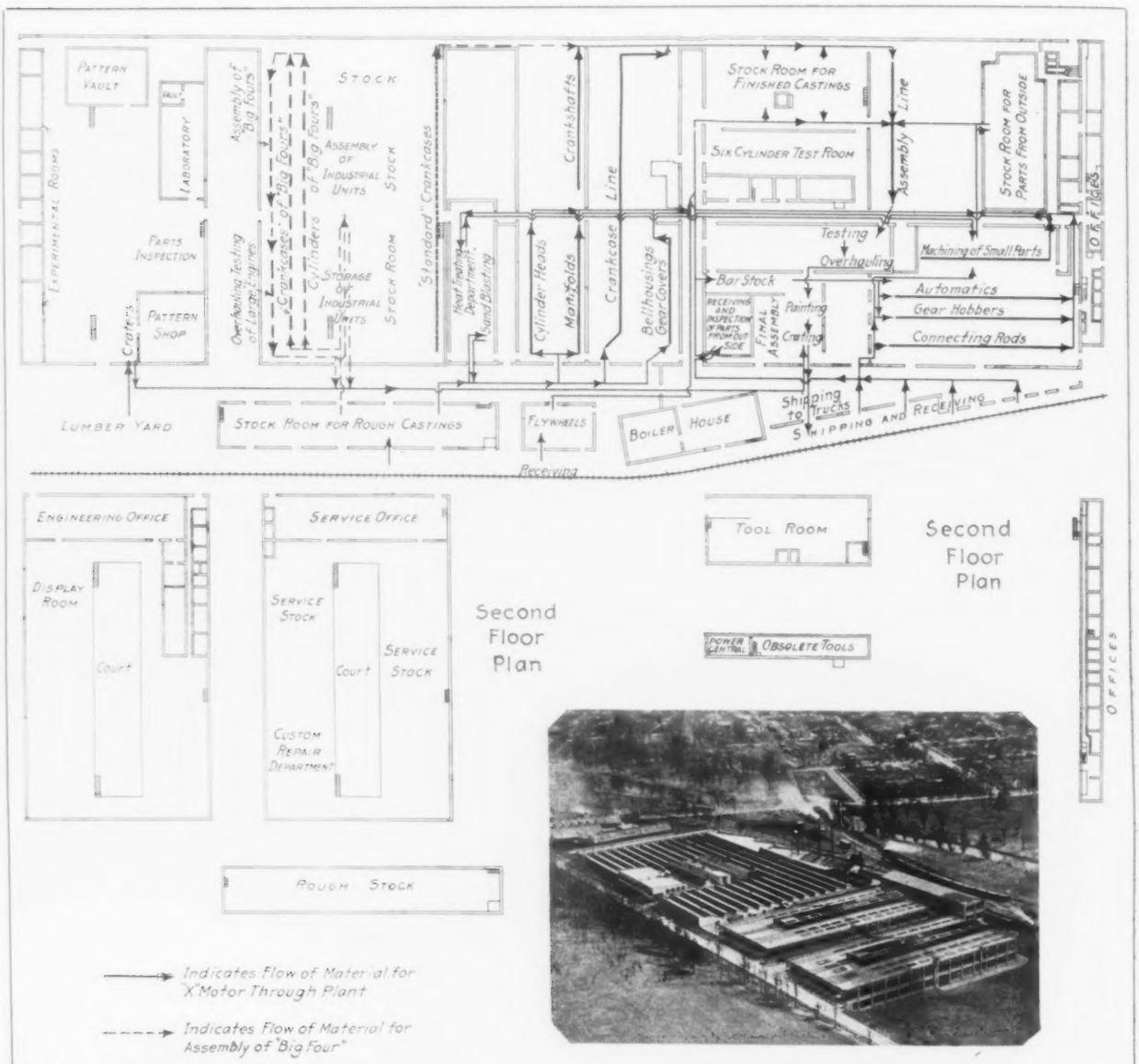
Flow of Work Makes Complete Circle

"The other end of the works is devoted to building engines of less than 70 hp. In this section of the plant there are separate departments for the machine work on different parts. The flow of material makes a complete circle from the unloading platforms through the various machine shops and back through the assembly department, testing department, painting room and shipping room. This method has been found most efficient and flexible for handling the varying requirements of our trade.

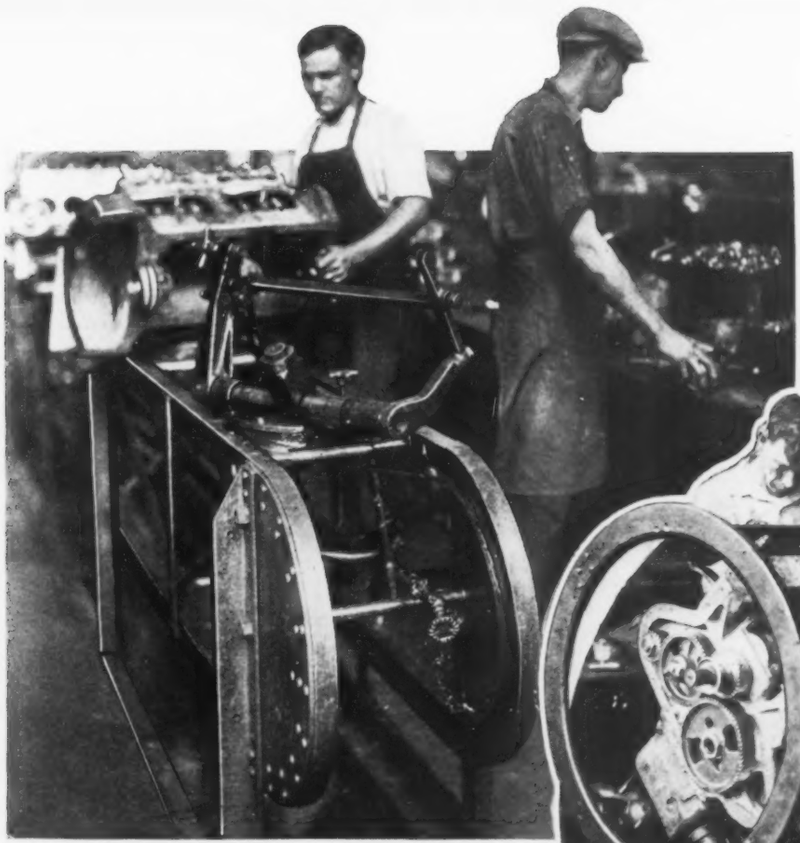
"Just as we have had to work out our own problems as to the flow of work, we have likewise had to develop our own methods of handling materials. The pieces going into our engines are heavier than the ordinary automotive sizes and are difficult to handle in a mass production way. We have made it a point, therefore, to relieve the workman of lifting wherever possible. We are convinced that the greatest opportunity for further economy lies in reducing the time of putting a piece in a machine and taking it out.

Material Handling Problem Given Special Study

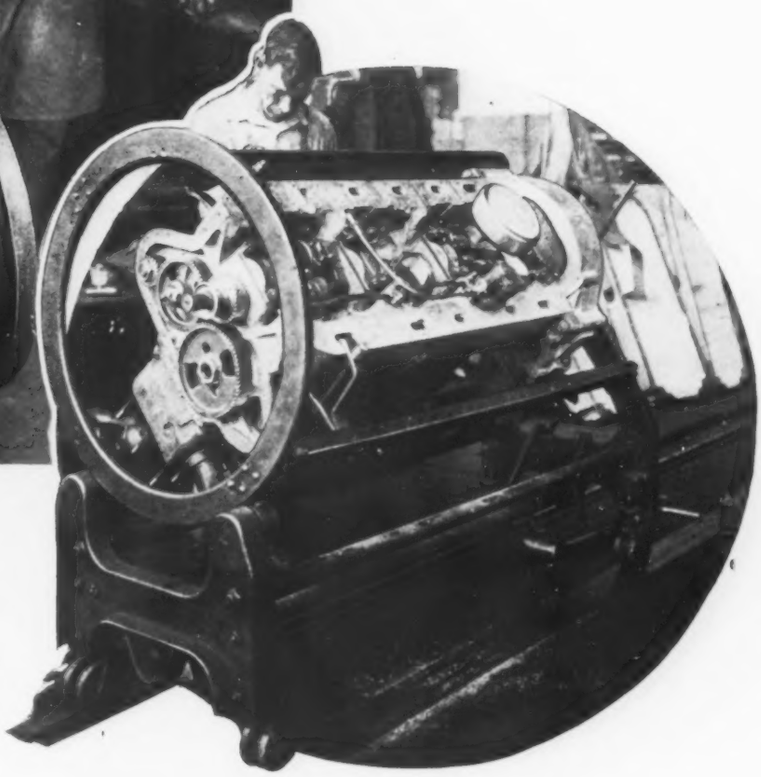
"We have not adopted any one method of handling materials. Each operation is studied by itself and the most suitable device is provided. The plant is equipped with



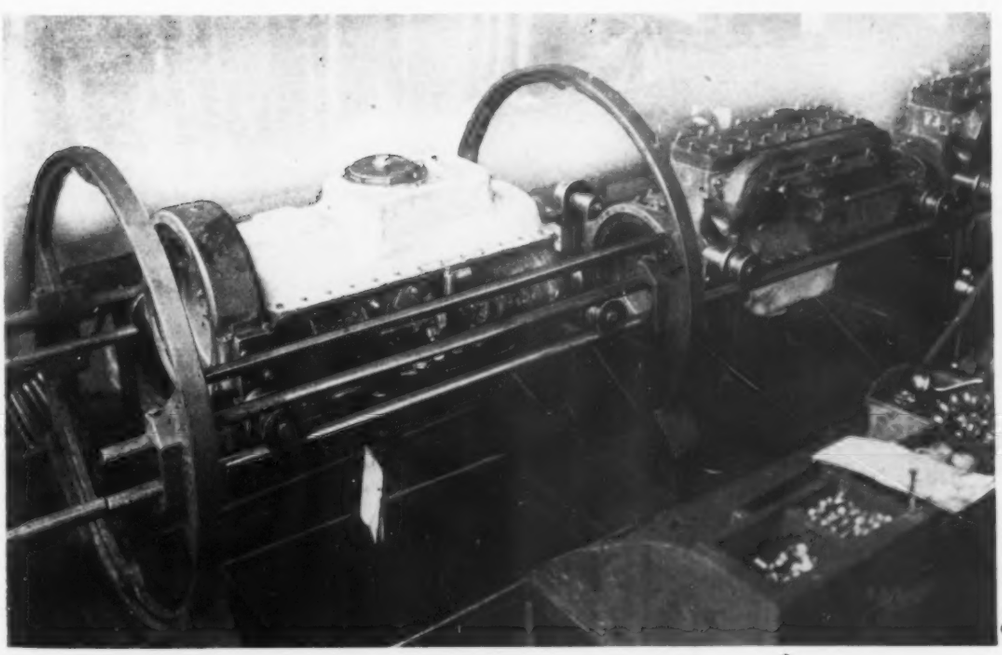
PLAN and Airplane View of Waukesha Motor Co. Plant. To obtain a flexibility in operation that will permit it to produce 30 different models of gas engines at prices that reflect mass production, the company has departmentalized its operations both as to parts and size of completed product. In building smaller engines, of which "X" motor is typical, the flow of material makes a complete circle from the unloading platforms through the various departments to the shipping room. On the other hand, a straight-line flow of materials characterizes the building of the "Big Four," one of the larger models



THE Smallest Motors Are Assembled on Carriages Running on a Continuous Track (Left). The working frame of the carriage is hinged and swiveled to allow movement 180 deg. through a vertical arc and 360 deg. through a horizontal circle



FOR Assembling Larger Engines a Portable Rollover Frame (Right) Is Used. The crankcase casting with its flywheel housing is the first part to be attached to the rollover. Others are added as the frame is moved along the assembly line, the rollover being rotated as required



ENGINES of Intermediate Weight Are Assembled on Carriages Running on Tracks Waist High (Left). Where it is necessary to turn the work over, rollover stations like the one shown are provided

gasoline and storage battery trucks of the lift type, overhead electric and hand-operated traveling cranes, monorail systems, pneumatic and electric hoists, chain blocks and gravity roller conveyors. For our assembly departments we use conveying equipment of our own design, adapted to our particular needs.

"While study of material handling is important to cost reduction, the maintenance of uniform quality in our product is also highly essential, both as a means of holding and of expanding our markets. Each step in operations is followed by an inspection, and there is a final general inspection before shipment is made. Nine per cent of all the labor in the plant is employed in inspection.

"All engines, after assembly, are tested, overhauled, reassembled and final-tested. Four-cylinder motors are run on their own power for 6 to 10 hr. Six-cylinder engines, as well as the larger four-cylinder units when requested, are given horsepower rating tests on dynamometers or testing fans. The plant is equipped with 14 laboratory-type cradle dynamometers.

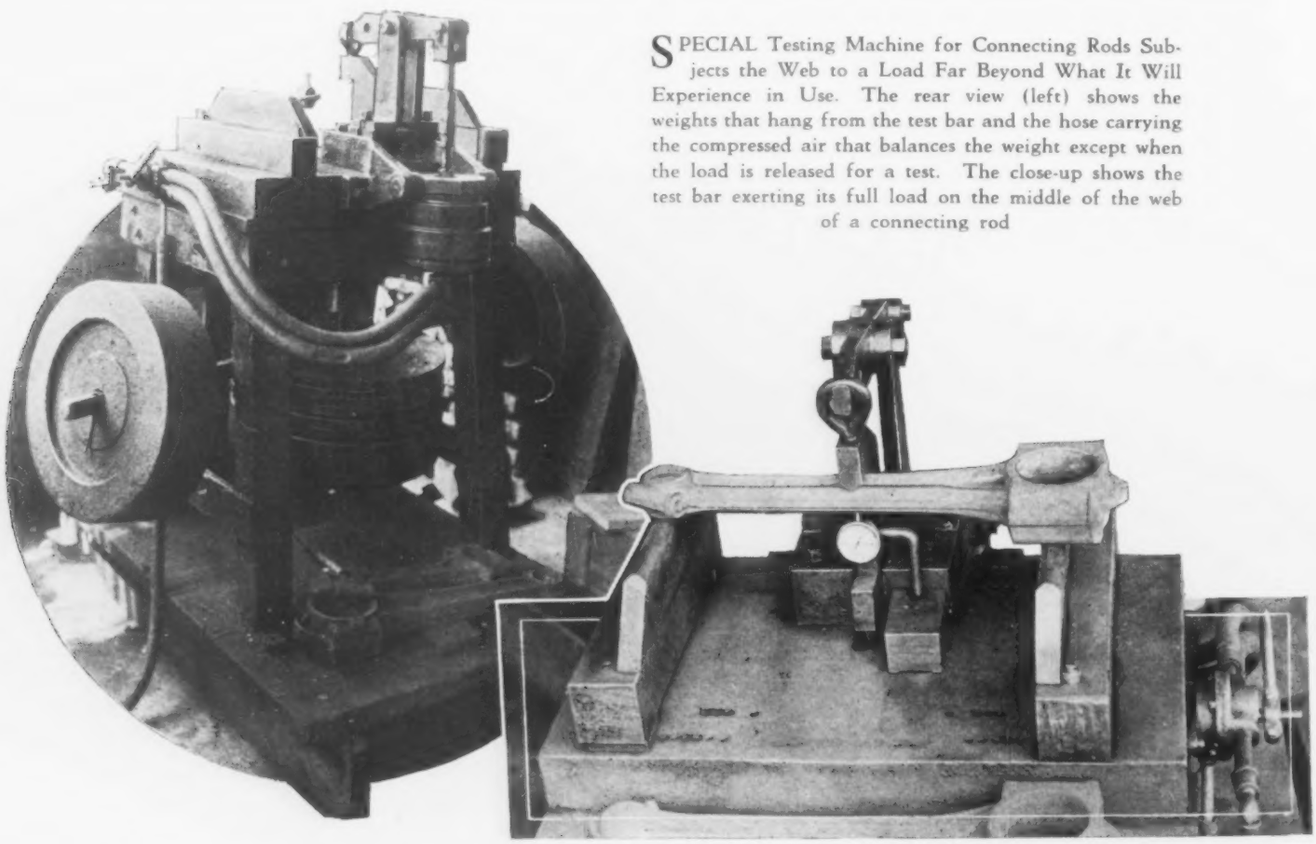
"Testing, overhauling, material handling, flow of work and scheduling of orders do not tell the whole story in this highly competitive era. Organized research is also necessary to develop new methods and new products. The Waukesha Motor Co. has an engineering department with a personnel of 57, one-third of whom devote all of their time to research. Our engineers, in cooperation with the United States Bureau of Standards, the Petroleum Institute and the Society of Automotive Engineers, have designed and built a gas engine for testing and measuring the knocks developed by different kinds of fuel.

"One of our most important undertakings, now in an experimental stage, is the development of a Diesel engine of one-half the customary weight, which now runs from 60 to 70 lb. per horsepower.

"In our efforts to improve our manufacturing methods and to better our products, we recognize the need for keeping in close touch with developments throughout the field of industry both here and abroad. An excellent means to that end is our library, in which we keep 59 technical and trade magazines, including THE IRON AGE and English and Continental periodicals. As an indication of how strenuously these papers are used, we have frequently put improvements into practice within one week after the receipt of the publications from which the ideas were obtained.

"We also have a circulating library of 1143 volumes of technical reference books."

The Waukesha Motor Co., of which Mr. Horning has been president since its founding in 1906, originally made automobile motors. Subsequently it went into the production of truck engines and then industrial engines. Today it is one of the largest makers of industrial automotive-type gas engines in the world, making 70,000 motors a year.



SPECIAL Testing Machine for Connecting Rods Subjects the Web to a Load Far Beyond What It Will Experience in Use. The rear view (left) shows the weights that hang from the test bar and the hose carrying the compressed air that balances the weight except when the load is released for a test. The close-up shows the test bar exerting its full load on the middle of the web of a connecting rod

In terms of value 50 per cent of its output goes into motor trucks, buses and other large units, such as engines for gas-electric railroad coaches. Another 10 per cent is in gas engines for the oil fields, both in this and foreign countries. The remainder is in motors for a wide range of industrial uses.

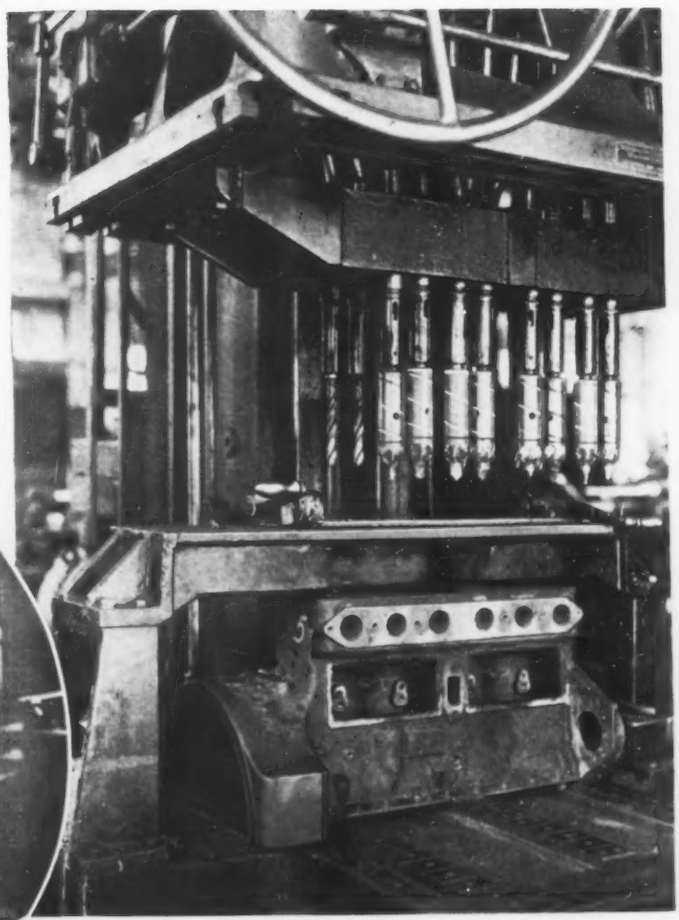
The company uses 25,000 tons of alloy gray iron castings annually, representing 25 per cent of the value of its product. Another 12 per cent is accounted for by steel forgings, and a large quantity of steel stampings is used. No malleable or steel castings are employed, however.

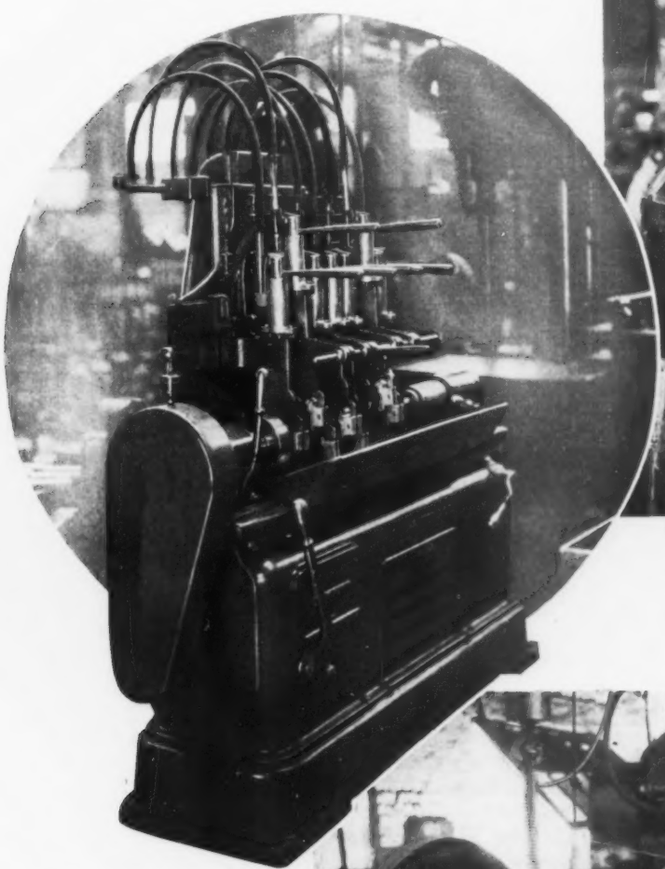
Heat treating, done in gas furnaces, constitutes an important stage of the manufacturing operations. From 5000 to 7000 pieces are heat treated daily.

Special Testing Machine Devised for Connecting Rods

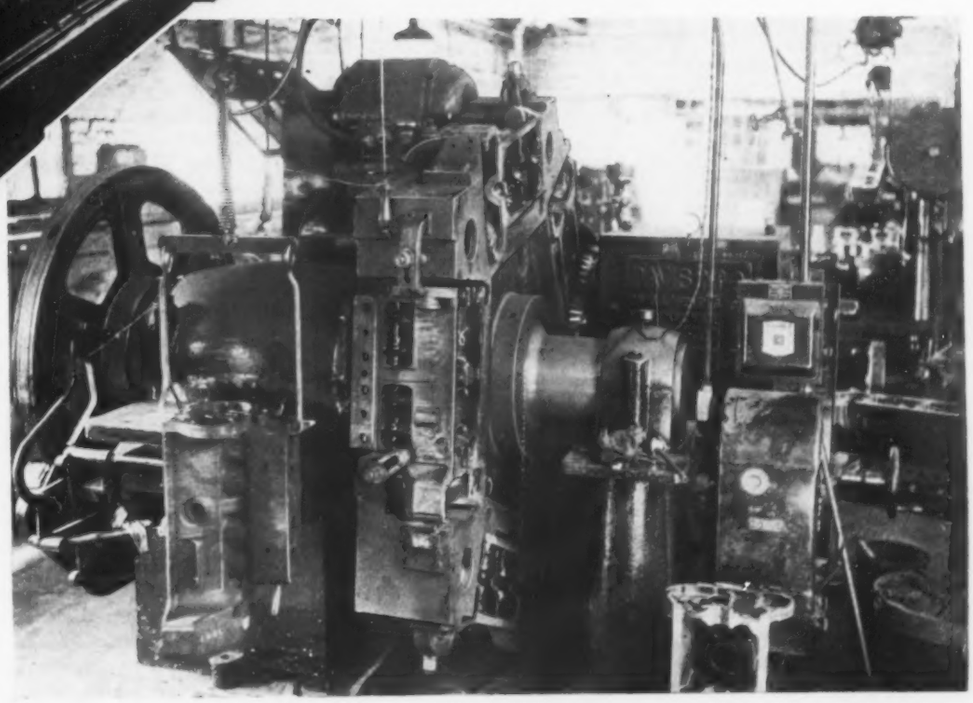
Important pieces are tested after heat treating. Satisfactory equipment for testing connecting rods was lacking; so the company devised its own. It had been found that testing the large end of the rod for hardness was no sure index of the strength of the web, frequently failing

THE Main and Throw Bearings of Crankshafts Are Simultaneously Honed in an Automatic Machine Built by A. P. Schraner & Co., Cleveland. Each honing head has six carborundum stones, and each bearing is continuously flushed with kerosene during operation. The crankshaft is driven by a lug in the headstock spindle, the lug being engaged by the headstock handle. The front end of the shaft is carried by a quick-acting tailstock with a live center. The platen in which head and tailstocks are mounted is given a reciprocating motion of ⅛ in., moving the shaft laterally as it rotates and thereby facilitating honing. To permit this the stones are ⅛ in. shorter than the length of the bearings. When the machine stops the throwheads are clamped in the position they are left by the shaft. The operator then opens the heads by turning a handwheel, lifting the entire head assembly, which is carried by a slide, away from the shaft. The same handwheel lowers the heads over the next crankshaft. The time of operation is about 3½ min. floor to floor





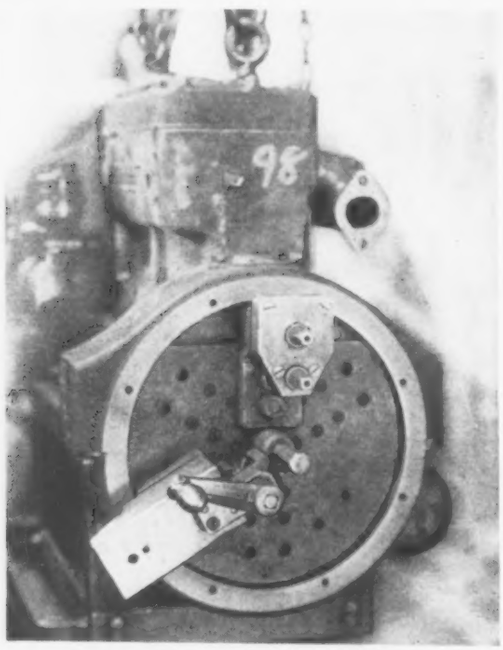
CLUSTER Plates (above) Drilled for Specific Operations Conserve Time. Accurate alinement of the drills is assured by the holes in the plate. Adjustable screw bushings in the holes permit the tools to be accurately set for depth



EQUIPMENT Includes Production Tools of the Largest Type Used in Automotive Plants, Such as the Continuous No. 3 Davis Milling Machine (Right) Built by the Davis & Thompson Co., Milwaukee. The machine weighs 28,000 lb. and its rotating drum carries five cylinder blocks. It takes 16-in. face mills and is capable of feeding 20 in. a minute past the cutters. As in the case of all other heavy equipment, special attention has been given to material handling. Cylinder blocks are suspended from air hoists by springs, so that they may be loaded on to the drum without requiring precise adjustment through the pendant control

to disclose flaws or cracks not discovered under inspection. A machine was therefore developed which subjects the web to a load far beyond what it will experience in use.

The ends of the connecting rod are placed on V-blocks, with the middle of the web suspended underneath a notched bar to which given weights are attached. Compressed air is used to balance this weight, keeping the testing bar free from the web of the connecting rod while it is being placed preparatory to the test. By means of a valve on the side of the machine the air pressure is exhausted and the testing bar is dropped on the connecting rod. The rod shown in the illustration, resting on 18-in. centers, is being subjected to a load of 1100 lb. The deflection permissible is 0.08 in., with a return to zero after the load is lifted. A D. C. Ames dial indicator is used to measure the deflection. All connecting rods are given this kind of test, and failures have been practically eliminated.



USING the Crankshaft as a Spindle with Drive by a 1-Hp. Motor, and Using the Flywheel as a Tool Holder, the Circle of the Flywheel Housing Is Bored and the Flange Is Faced. This rectifies any slight misplacement of the crankshaft as a result of the insertion and scraping of bearings

Different Types of Equipment Used in Assembly Lines

Equipment used in assembling varies according to the size of the engines made. For the larger engines, exclusive of those built on a stationary stand, a portable rollover frame is used. The crankcase casting with its flywheel housing is first attached to the assembly rollover and then the frame is rolled forward and crankshaft, camshaft and cylinder blocks, with valves, are added. Later timing gears and flywheel are fitted in. Subsequently pistons and rods, timing gear cover, manifold, cylinder heads, water pump and final trimmings are put on. The rollover permits the workman to turn the work completely over so that he can operate without stooping, stretching or straining. The rollover frame is supported on casters. These run on tracks in the assembly line, but can be operated on ordinary floor surface likewise.

Engines of intermediate weight are assembled on carriages running on tracks waist high extending the length of the assembly line. The carriages are equipped with flanged wheels which fit the cold-rolled rounds that serve as the tracks. At different points in the line, where it is necessary to turn the work over, rollover stations have been provided. These consist of concave supporting bearings for the hoop-like frame ends, which are connected on opposite sides by double tracks of steel rounds. When the work is in the frame the carriage wheels rest between the tracks. Either track can be made to coincide with the adjoining stationary tracks by rolling the frame.

The smallest motors are assembled on a continuous track—the carriages passing from one end to the other and then being returned underneath to the beginning of the line. The working frame is hinged to permit movement 180 deg. through a vertical arc and is swiveled on the carriage to allow movement 360 deg. through a horizontal circle. Bolts, nuts, gears and other small parts and fittings are distributed every morning in the benches in front of the assembly line by a stock boy. Whenever a work order is issued the proper number of parts for a day's operations are requisitioned from the stock room.

The three different types of assembly equipment are covered by Waukesha Motor Co. patents.

Squaring Up Flange of Flywheel Housing with Crankshaft

The final operation in the assembly of the smaller motors is an ingenious one. The insertion and scraping of bearings in the crankcase sometimes throws the crankshaft slightly out of square with the flange of the flywheel housing. To rectify such a condition the crankshaft is used as a spindle, being driven through reduction gears from a 1-hp. motor, and the flywheel is used as a tool holder. As the flywheel rotates the flange is faced and the flywheel housing circle is bored. An operator feeds the tools manually through bevel gears operated by a handle.

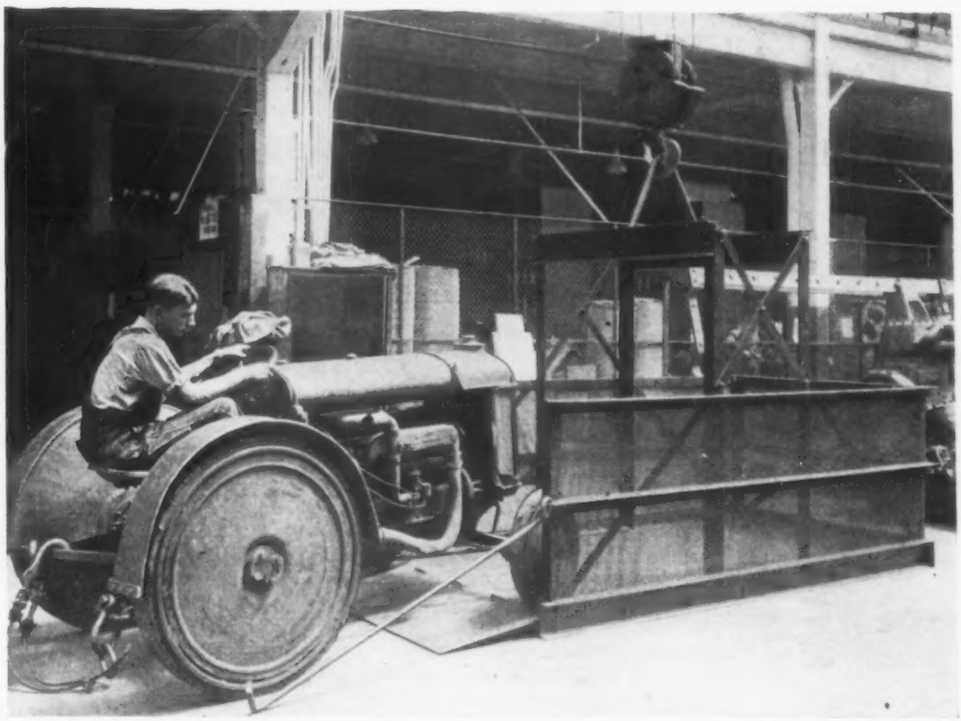
The machining of parts going into Waukesha engines is on a highly developed production basis. For example, five engine block castings are milled in one set-up on a rotary No. 3 Davis milling machine, the work rotating past the milling cutters. Similarly, multiple boring machines are used to bore the cylinder chambers of an engine block simultaneously. Other notable equipment includes a bank of three two-way multiple tapping machines and a bank of three two-way multiple drilling machines.

Cluster Plates Cut Down Set-Up Time

For other multiple drilling operations cluster plates, designed by A. Herzberg, factory superintendent, are used on standard upright multiple drilling machines. Accurate alinement of the tools for particular operations is insured by the holes in the cluster plate. By means of screw bushings in the holes, adjustable by screw driver, the tools are accurately set for depth. An ordinary set-up on a multiple drill formerly took 3 to 8 hr. Now it takes 20 min. to 1 hr. Moreover, the bushings and jigs are virtually everlasting. In the illustration the set-up is for boring and reaming for bushings for the engine valves and then drilling the valve stem guide holes. All machine work is done to very close limits.

Another multiple production operation that is outstanding is the honing of crankshafts. For this purpose a machine built by A. P. Schraner & Co., Cleveland, is used. The bearings and throws of the shaft are honed simultaneously. The honing heads are adjustable vertically and horizontally and need only be set once for a given size of crankshaft. The honing heads reciprocate with the throws of the shaft. Honing is by flat carburundum stones, the surfaces of which are at right angles to the radius of the bearing. Both crankshafts and flywheels are balanced both dynamically and statically.

An addition to the plant, increasing the area 50 per cent, was completed in May this year. The present di-



A CRANE Basket Has Been Provided for Hoisting Industrial Truckloads of Material from Main Floor to Service Stockroom on Balcony

mensions are 400 x 1400 ft. The older part of the plant is of saw-tooth roof construction. The addition consists of two monitor-type buildings, with central bays extending to the roof and balconies located on each side.

The balcony floor of one of these buildings is occupied by a custom repair shop and replacement parts department. Here replacement parts are got ready for shipment and engines of clients are reconditioned. This department now accounts for 10 per cent of the company's business. On the main floor of the central bay is the completed unit department. Here engines requiring special transmission, special mounting or specialized trucks are assembled for shipment. This class of business also represents 10 per cent of the company's total.

The bay of this building, as well as the other monitor-type structure, is served by a 5-ton overhead electric traveling crane. To facilitate the movement of small parts from the central bay to the balcony a crane basket is used, the crane hook attaching to an eye on top of the basket. Trucks run on to the basket on the main floor are run off on projections under the crane runway from the balconies.

The second monitor-type building is devoted to engineering and experimental purposes, and also contains a pattern shop. All of the buildings are connected on the side opposite the receiving and shipping platform by a wide aisle, facilitating communication between departments by gasoline and storage battery trucks.

The shipping and receiving side is served by tracks from the Chicago, Milwaukee, St. Paul & Pacific and Chicago & North Western railroads.

The Waukesha Motor Co., under normal operations, employs 1800 people, all but 200 of whom are engaged in production.

Utility of Cadmium Rapidly Expanding

PRACTICALLY all of the world's production of cadmium comes from the treatment of the impure zinc solutions used for preparing electrolytic zinc, so that the potential output of cadmium bears a very direct relation to the amount of electrolytic zinc produced, writes C. P. Linville in "Mineral Industry, 1928." In 1928 there was a greatly increased production; prices also increased to 85 to 90c. a pound.

There are four uses recently developed which account for the rapidly increasing demand for cadmium. It is being used in increasing amounts in making cadmium solders. The Udylite process is a rust-proofing process, in which iron articles such as locks, small hardware, and automobile parts are electroplated with the metal, after which the work is heated in an oven for several hours at a temperature of from 150 to 200 deg. C.

The Cadalyte process, which is an electroplating process giving a bright silver-like finish, is also being extensively used. Cadmium plating is also used in connection with chromium plating, the work being first given a cadmium coat, then the final chromium plate.

A small amount added to silver alloys makes the silver whiter and more resistant to tarnish. Cadmium has also other uses in jewelry, giving with gold a green alloy. When added to aluminum which is to be used in making powder it improves the color and luster of the powder and makes it more resistant to corrosion.

Cadmium still continues to be extensively used in making fusible alloys. When added in small amounts to copper, the wire drawn from the alloy has greater strength for use in transmission lines without having its conductivity appreciably reduced.

Record Speed Made in Steel Erection

Steel Framework of Bank of Manhattan Building, 71 Stories, Will Be Completed in Less Than Four Months—Special Drilling Equipment Expedites Fabrication

The New Bank of Manhattan Building, 71 Stories, Will Top the 792 Ft. of the Woolworth Building by More Than 100 Ft. and Will Be 11 Floors Higher

FOR speed of steel fabrication and erection, the 71-story Bank of Manhattan Building, now in course of construction at 40 Wall Street, New York, probably will break all known records.

Although the first slabs for column supports were not delivered on the ground until the third week of June, the final piece of steel in the tower will have been set in place and the last rivet will have been driven by Oct. 15, or within a few days of that date.

So far as known, no steel frame of this size has ever before been completed in so short a time—less than four months—even in New York, where high ground values and idle investment make speed more of an essential than in less crowded communities.

When the decision was reached by the Bank of the Manhattan Co. and the Starrett Corporation to build the tallest building in the world, it was realized that fast work would have to be done to complete the structure in time for occupancy on May 1, 1930, May Day being the customary moving day for New York business, all leases expiring on that date.

Coordination of Work Made Record Possible

That the building will be completed within schedule time, probably eclipsing by several months any construction record achieved in the United States for so large a structure, will be due, it is stated, to the complete coordination of all who were factors in its construction—the architects, engineers, owners, contractors and the steel fabricator.

Speed being an essential part of the building program, there was no waiting for finished plans before work was begun. The foundations were started, in fact, before the work of demolishing the old buildings had been completed. Demolition was rushed by three shifts of workmen.

Ordinarily, an architect has his plans prepared three or four months before a building is started, but in this case architects, engineers and contractors all started at about the same time, and plans were so dovetailed that the building has gone up floor by floor without a serious hitch.

As rapidly as Craig Severance, architect, and Yasuo Matsui, consulting architect, could prepare preliminary plans, Starrett Brothers, the general contractors, let the sub-contracts. The contract for the steel was placed with the Levering & Garrigues Co., New York, whose fabricating plant is at Dunellen, N. J. This contract was unusual, even apart from the time element involved for the completion of the work, in that it gave to the steel fabricator the engineering work and detailing in connection with the job, as well as the fabrication and erection. The steel totaled more than 17,000 tons.

Steel Deliveries Anticipated Contract Requirement

This contract was received by the Levering & Garrigues Co. on March 20, this year, and it provided that the first steel should be on the ground not later than June 26 and the last steel by Oct. 15. The initial delivery of steel anticipated the contract date by several days.

An example of the speed attained is that only six weeks elapsed from the time the steel contract was let to the completion of the detail plans from which the steel could be ordered from the mill for fabrication.

Favored by weather almost devoid of rain, the fabricator has been able to keep ahead of schedule, sometimes by three or four days.

To accomplish this record, the Levering & Garrigues Co. augmented its own organization with that of the structural engineering firm of Purdy & Henderson, New York, who handled much of the steel planning. In the production work it obtained the cooperation of the Bethlehem Steel Corporation, which devoted its fabricating shops to the initial part of the structural work in addition to providing definite rolling schedules for the plain material that would fit in closely with actual requirements of the shops.

Steel Work Half Done Before Foundations Were Completed

It has been possible for the steel erection to go ahead at an unusually fast pace partly because of the fact that the erection of the framework was started before the foundation work had been completed. Temporary foundations were put in to save time, and as the steel work progressed the permanent foundations were built. The steel work was about half erected, however, before the foundation work was all done.

How this has worked out as a time-saver is shown by the fact that foundation work is still in progress and no steel erection has been started on a building of comparable size in the downtown New York district, although the contract for the latter structure was let at about the same time as that for the Bank of Manhattan Building.

The steel work on the bottom floors of the Bank of Manhattan Building was in progress long before the steel design for the upper floors had been finished. The steel designing and detailing went along with the architectural development. This helped the fabricator to rush the steel erection, there being no waiting for the complete steel design before proceeding, as is the case with most steel structures.

Column Slabs of Unusual Size Used

The design of the bank building, from a structural steel standpoint, does not differ materially from that of other tower buildings. However, the heavy load that is to be carried called for extremely rugged construction,

which began with the slabs under the tower column. These slabs are said to be the largest ever used in a building of this type. The largest were 14 in. thick, 84 in. wide and 7 ft. 10 in. long, weighing 31,000 lb. each. They were rolled on the large plate mill of the Lukens Steel Co., Coatesville, Pa.

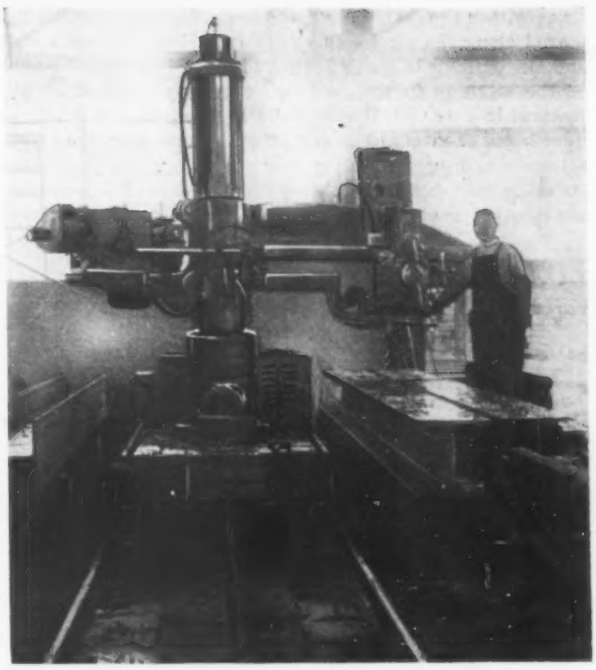
Special Drilling Equipment Speeds Fabrication

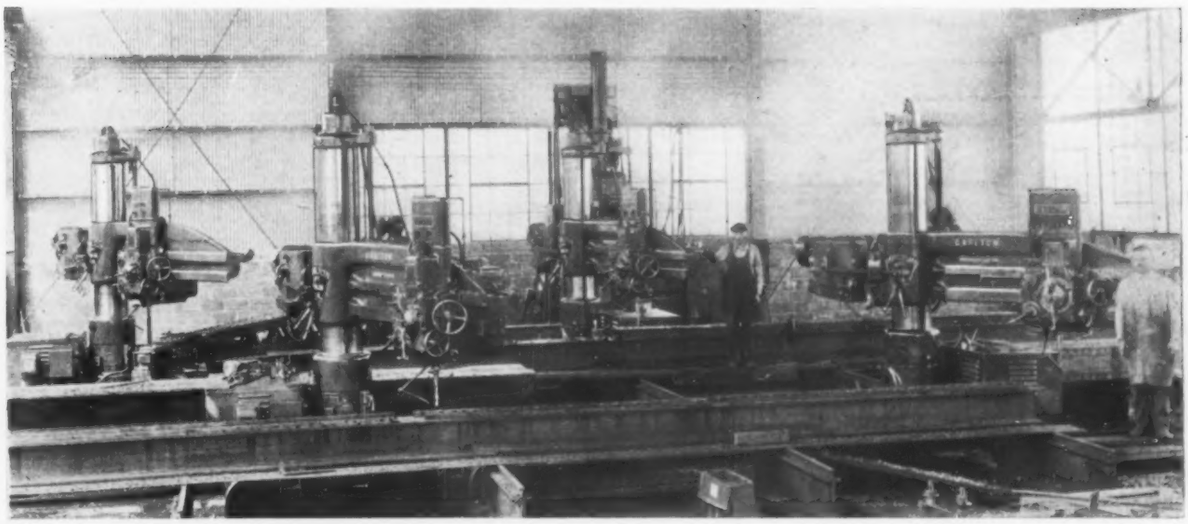
One of the important factors in expediting fabricating work was the installation by the Levering & Garrigues Co. of four special Carlton radial drills, which in actual operation have doubled the tonnage which the fabricator would have been able to turn out without them.

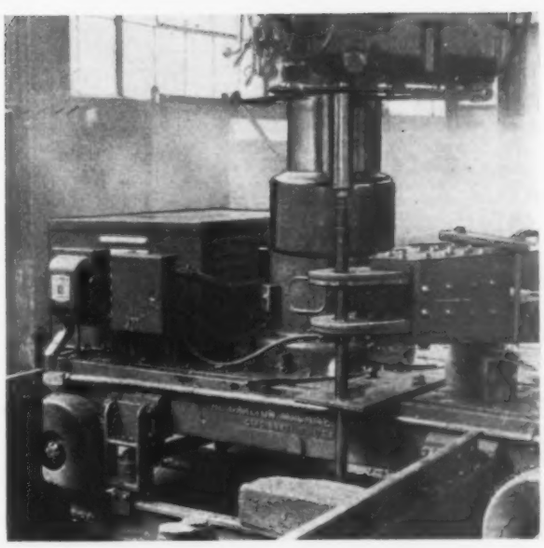
This equipment was bought after the company had received its Bank of Manhattan contract, and it was installed and in operation within six weeks from the date of the order.

These radial drilling machines are mounted on wheels which run on T-head rails and permit the machine to be moved along the work. Material, such as long I-beams, is supported on I-beams that are mounted on a concrete base and have a T-rail at the top. These work supports, at right angles to the base of the machines, are spaced on 4-ft. centers. They are, of course, carefully leveled so that the drilled hole will be straight.

The machines have 6-ft. arms. After drilling all the







A BATTERY of Four Special Radial Drills, Shown in the Center Illustration, Have Greatly Expedited Work in the Levering & Garrigues Co. Shop. These machines are mounted on wheels which run on T-head rails and permit the machines to be moved along the work

* * *

WIRES Suspended in the Compound Trough in the Floor Between the Rails Carry the Current for the Machines, a Collector Arm Passing in the Slot Taking the Current. These wires are suspended in the trough so as to be clear of the coolant, which can be taken up at any point along the rails. The arrangement of this trough is shown in the top illustration

* * *

SEPARATE Push Buttons at the Operator's Position Control the Locking, Unlocking and Traveling of the Machine Along the Rails. The lower illustration shows the rail clamp in position

holes within the 6-ft. radius, the portable base is unlocked, moved along the tracks under its own power, locked again and the drilling is continued as before. Drilling of much of the work is to templates. Centralized control of all motions is a feature that permits high-production drilling. Speed and feed changes are made at the head (through selective sliding gears), column clamping, elevating and lowering also being controlled from the head. Separate push-button control is provided at the operator's position for locking, unlocking and moving the machine along the rails.

These machines are capable of drilling up to 3-in. holes in steel. Speeds range from 12 to 1200, the number of speeds being 24. Twelve feeds, ranging from 0.009 to 0.0125 in., are obtainable. The spindle drive is by a 10-hp., 1200 r.p.m. motor mounted on the arm, and the drive of the portable base along the rails is by means of a fractional horsepower motor mounted on the base. The base is the usual T-slotted arrangement that permits clamping miscellaneous work.

Work supports, which are mounted at right angles to the runway rails, are on both sides of the runway, which makes it possible for the operator to be drilling on one side while the material is being loaded and set on the opposite side, as the arm can be moved in a complete circle. The operator thereby can obtain continuous drilling as he is not held up for the loading and unloading and turnover or for crane service.

At the top of the columns are special rotary contactors which deliver the current to all of the motors, the main feed cable coming up through the center of the column. This permits the arm to be revolved in a full circle in either direction.

Coolant Runs in Covered Trough in Floor

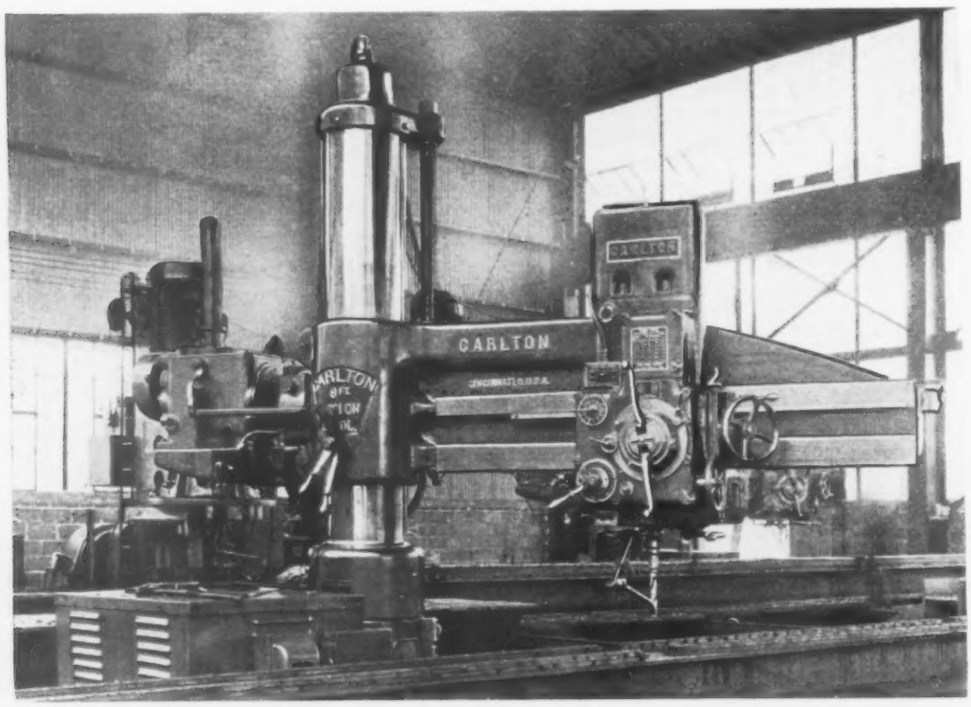
Between the rails is the compound trough, which is covered by cover plates, and there is a slot the full length of the runway which permits coolant to be taken up at any position along the rails and the return flow to find its way back to the trough after being strained.

There is also a collector arm which passes in the same slot and takes the current from wires suspended in the trough, but clear of the coolant. There is an overflow in the trough which prevents the coolant from rising above a certain height.

All bearings are ball bearings, fully inclosed, running in oil, thereby requiring lubrication attention only about every six months.

In actual practice, each machine has averaged about 1600 in. penetration a day, and this could be increased probably to 2000 in. except that the additional speed wears down the drill steel too rapidly to be economical.

Engineering work in connection with the installation of the drilling equipment was done by Wilson-Brown, Inc., 30 Church Street.



WHILE the Machine Is Drilling on One Side, Material Is Being Loaded and Set on the Opposite Side, as the Arm Can Be Swung to Either Side. Continuous drilling can be done as the operator is not held up for loading or unloading or for crane service

Various Uses for Nickel

Robert C. Stanley, president International Nickel Co., estimates the various uses in which nickel is employed, as follows, based on an output of 40,000 tons a year:

	Tons
Nickel silver	6,000
Coinage	800
Nickel plating	2,000
Structural nickel steel	14,000
Copper-nickel alloys	800
Nickel catalyzers	400
Edison storage battery	800
Monel metal	8,000
Heat-resisting electrical alloys	2,000
Malleable nickel	2,000
Nickel steel castings	800
Nickel bronze	400
Corrosion-resistant steels	400
Ferro nickel alloys	800
Nickel cast iron	400
Miscellaneous alloys	400

There is not likely to be much decline in the use of nickel for armor plate or ordnance equipment, according to "Mineral Industry, 1928," the estimate for which use is now 4000 tons per annum. New naval cruisers are not likely to cause a marked increase, since the trend of naval construction is toward the elimination of heavy protective armor in order to increase speed. The use of monel metal is firmly established, while nickel steel and nickel steel castings in railroad equipment are coming more and more into favor. In fact, the use of nickel for improving cast iron is likely to take its place as a standard practice.

Comprehensive Congress on Metals

Steel Treaters Gather Together Five Technical Organizations in National Metal Congress and Exposition—Wealth of Papers and a Diversified Exhibition

"GREATEST meeting of metal men ever held"—these were the words of Dr. Zay Jeffries, president of the American Society for Steel Treating, at the annual banquet of the National Metal Congress held in Cleveland, Sept. 9 to 13, inclusive. Facts seem to bear out this statement.

In numbers the total registration of members and guests showed 5840, the largest enrollment in some years, due perhaps to the general acceptance by industries at large of the national metal congress idea. In technical contributions, again, almost every phase was covered and their high grade was generally acknowledged. In enthusiasm, one could hardly ask for more. In smoothness of operation and handling, the congress was eminently successful. In displays at the exposition—while not larger than previous ones, in diversity, scope and attractiveness the exhibits left little to be desired.

Thomas A. Edison was made an honorary member of the steel treaters. In his enforced absence by illness acceptance was expressed in his behalf by Harvey Firestone, Sr., a lifelong friend.

A symposium on nitriding and a session on steel metallurgy were impressive features. At the exhibit late developments in rustless iron, tungsten-carbide tools, and nitrided steels were most prominent. Attendance at the National Metal Exposition was reported by Secretary Eisenman as 53,121.

Technical Features of the Congress

COMMENT was heard on every side regarding the unusual excellence of the technical papers this year. This was particularly true of the 35 papers scheduled for the ten sessions of the A. S. S. T. Besides these there were 20 papers contributed to programs for the American Welding Society, 18 for the Institute of Metals Division and 10 for the Iron and Steel Division of the American Institute of Mining and Metallurgical Engineers as well as 11 for the Iron and Steel Division of the American Society of Mechanical Engineers—94 in all for the week.

A climax was reached on the last day of the A. S. S. T. sessions. This was devoted to a symposium on nitriding. The society has never held so important a meeting nor one so largely attended—evidence of the keen interest in this new development. Dr. Adolph Fry of Germany, who originated the process, and Dr. Paul Aubert of Paris, the commercial developer, were present and spoke. Eight papers and an address by Doctor Fry were presented and briefly discussed. These are reviewed on other pages.

Another splendid A. S. S. T. session was devoted to steel

Foreign Visitors at the Congress Numbered Nearly Twenty

Dr. F. Koerber, director of the Kaiser-Wilhelm Institute, Germany.
Dr. E. H. Schulz, director of the research institute of the Vereinigte Stahlwerke, A-G., Germany.
Dr. Otto Petersen, president of the German Iron and Steel Institute.
Dr. Adolph Fry, Krupp Laboratories, Essen, Germany.
Dr. Paul Aubert, Aubert Frères et Duval, Paris, France.
Ernest Hoessrich, engineer, Gunther & Co., Frankfurt-am-Main, Germany.
J. D. Volckman, sales engineer, James W. Pyke, Montreal, Canada.
W. E. Siler, inspector of tools, Canadian National Railways, Winnipeg, Manitoba.
W. D. Pugh, research assistant, English Steel Corporation, Sheffield, England.
C. K. Everitt, managing director and works manager, Edgar Allen & Co., Ltd., Sheffield, England.
Waldemar O. Freyberg, professor, Polytechnical Institute, Harbin, Manchuria, China.
Moses M. Yaskolka, mechanical engineer, tractor department, Krasug Putilovetz plant, Leningrad, Russia.
Dr. M. Suzuki, chief of materials section, Japanese Government Railways, Tokio, Japan.
M. Sakata, Japanese Navy.
T. Nagao, Japanese Army.
Fernand Turretini, director general, Société Genevoise d'Instruments de Physique, Geneva, Switzerland.
Cesare Parone, Milan, Italy.

manufacture. A review of the four excellent papers and discussions will be printed next week.

Besides these there were over 20 papers on a variety of subjects. In so vast a program it is impossible to dwell on all the papers. Many of them will be abstracted, some with their discussions, in future issues of THE IRON AGE.

Campbell Memorial Lecture on Steels at High Temperatures

IN the Campbell memorial lecture, which attracted some 500 listeners, Dr. Albert Sauveur, professor of metallurgy, Harvard University, discussed the "Strength of Steels at High Temperatures."

A novel method of testing was utilized. The test piece was a 15-in. length of square bar, turned to ½-in. diameter for ½ in. at its center. This necked portion was placed in the middle of a tube furnace, one end of the bar clamped in a vise, the other fixed by a coupling to a shaft resting in a bearing and carrying a sheave on its overhanging end. By means of a rope and a pail of shot, a gradually increasing load was added at the rim of the sheave, thus inducing torsion in the heated test piece. Relations between twist and time were recorded on a chart.

Significant data were said by the lecturer to be the torsional strength of the hot metal, the number of twists before fracture (related to the ductility), the twisting acceleration, and the "factor of stiffness" (a relation between stress and strain).

When such data were plotted against temperature for various carbon steels the "blue brittleness" range at 300 deg. C. was strongly marked by a peak in the factor of stiffness curve. The curve showing number of twists also shows jogs at the transformation points. The curves show that at 900 deg. C. all steels (which are then austenitic) have the same torsional strength, although the angles of twist vary widely and unaccountably. "Red shortness" is believed by Doctor Sauveur to be a property of gamma iron, and to be greatest at the lowest temperature at which gamma iron can exist, namely, just above the transformation on cooling.

A few of the time-twist diagrams, instead of being a regular curve like a sine curve, looked like a series of irregular steps. That is, the piece would twist rapidly, almost instantaneously, then as suddenly stop and hold fast for several seconds. This is characteristic of the failure of ferrite when breaking in the blue brittle range, or of severely cold-worked low-carbon steel.

The lecturer did not attempt to explain this effect, but controverted the idea that blue brittleness is due to nitrogen in metal by saying that the German steel Izett, which is free from the phenomenon, analyzes 0.017 per cent nitrogen, while an American soft steel containing only 0.008 per cent nitrogen is very brittle at 300 deg. C.

Many of the alloy steels tested were similar to those examined by F. H. Norton in time-consuming creep tests (see his book reviewed in THE IRON AGE, Sept. 12, page 687). A slide was shown comparing the creep stress as determined by Norton and the torsional strength as determined quickly by Sauveur; substantial parallelism and correct mutual relationships were apparent.

An interesting atmosphere was lent to the lecture in the fact that the presiding officer was Prof. H. M. Boylston, head of the department of metallurgy, Case School of Applied Science, Cleveland, and a lifelong associate of Doctor Sauveur in their work at Harvard in earlier years.

News Items of the Congress and Exposition

DURING the week the board of directors of the A. S. S. T. held sessions, and reports of officers were made at the society's annual meeting. At the banquet several honors and awards of medals were announced. These events were as follows:

Edison Made Honorary Member

Honorary membership was bestowed this year on Thomas Alva Edison, and in an impressive manner. At the banquet President Jeffries called on Harvey Firestone, Sr., president, Firestone Tire & Rubber Co., Akron, Ohio, who accepted the honor for Mr. Edison, whose recent illness prevented his presence. Mr. Firestone, in an intimate manner, gave some account of the life in camp of Mr. Edison, Mr. Burroughs, Mr. Ford and himself.

THOMAS A. EDISON
Honorary Member

ALBERT SAUVEUR
Campbell Lecturer

Howe Medalist for 1929

Award of the Howe medal for 1929 was made to Dr. C. R. Wohrman for his paper "Inclusions in Iron and Steel" published in the *Transactions*. The medal is awarded each year for the best paper during the year, July 1 to June 30. Dr. Albert Sauveur, who was a teacher of Doctor Wohrman, accepted the medal for the medalist, giving a sketch of Doctor Wohrman's career. He could not be present, but a cable of appreciation from him was read. He is in Switzerland, where he was located by his company, Bell Telephone Laboratories, New York, so that he could be with Mrs. Wohrman in her unsuccessful struggle with illness. He is doing special optical work in Geneva.

To Frederick G. Hughes, vice-president, New Departure Mfg. Co., Bristol, Conn., the past-president's medal was presented by Doctor Jeffries.

These honors were all announced at the banquet in the ballroom of the Hotel Cleveland. Representatives of all of the participating societies sat at the head table, except those of welding society, which held its own banquet the same evening.

"An Epoch in the Making" was the subject of the chief speaker at the banquet, Dr. William E. Wickenden, who has just assumed the presidency of Case School of Applied

Science, in Cleveland. It was a splendid effort—a plea for coordinated systematic research—"the price of progress and survival is research." It is hoped to publish an abstract later.

Twenty Visitors from Abroad

At no former congress has the attendance of foreign metallurgists been so large. Nearly 20 registered during the week, some of them prominent in their fields. A list of leading ones is found elsewhere.

In testimony of the cooperation and efficiency of the management of the Cleveland Public Auditorium, Col. H. J. Twelvetree, the manager, was presented by Secretary Eisenman at the banquet with a silver loving cup.

Future Conventions

Conventions of the future have been decided upon as follows:

Semi-annual convention, New York, February, 1930, auspices New York chapter.

Annual Congress and Exposition for 1930, week of Sept. 22, 1930, at Stevens Hotel, Chicago.

Semi-annual convention, 1931; San Francisco, as the Western Metal Congress and Exposition.

Officers Report on Society's Condition

THE society is in excellent condition both from the standpoint of growth and of financial status, according to the annual reports of W. H. Eisenman, secretary, and J. M. Watson, treasurer, submitted at the annual meeting. The membership increased 16 per cent during the year and now numbers 5615, including 4844 regular members, 522 sustaining members and 228 junior members. The treasurer's report showed that the receipts during the year were considerably over expenses.

President Zay Jeffries in his annual address stressed the hearty cooperation of other technical organizations with the society for a common purpose and said that the National Metal Congress held in connection with the technical sessions could not have been possible without the cooperation of the other technical societies. He also referred to the service rendered to the metal industry by the Steel Treaters' society and other technical organizations and declared that continued growth is inevitable. He also commended the officers and members of local chapters on the policy of holding joint meetings of local societies. He characterized the personnel as a happy family working for the same purpose. Doctor Jeffries also expressed appreciation of the fine quality and high character of the exhibits at the exposition congress. He said in part:

> While the primary object of the exposition is educational, it is essentially a sales institution. Up to two years ago certain restrictions were put on salesman members of the society. The removal of these restrictions was a recognition by the society that industry is endeavoring to operate all departments with one code of ethics. A corporation cannot escape the responsibility of an employee's untrue statement with the excuse that he is a salesman. Every employee is urged and expected to reflect the integrity of the organization which he represents.
>
> And so we find this year, to an extent never before realized, presidents and others in responsible positions in attendance at the booths. In many cases, the individuals who present papers and enter into discussions at the technical sessions are also in attendance at the booths. The information given out at the booths will in most cases stand the spotlight of scientific criticism. Thus, the latest technical developments are getting from the scienists to the public with a minimum of distortion.

Los Angeles Chapter Honored

Following the usual custom of presenting the president's bell to the chapter that has won particular distinction during the year, Doctor Jeffries announced that the custody of the bell had been awarded to the Los Angeles chapter for the coming year in recognition of its activities in connection with the Los Angeles meeting. He said that the Western States Metal and Machinery Exhibition and Western Metal Congress at Los Angeles in January was a marked achievement of the year.

The nominating committee reported the list of new officers as announced in THE IRON AGE last week and these were formally elected. President-elect R. G. Guthrie occupied the president's chair during Doctor Jeffries' address. New officers are listed in another column.

National Metal Exposition Very Comprehensive

NOTABLE advances made in the iron and steel industry during the past year in processes and equipment were brought to the attention of visitors at the National Metal Exposition. The exhibit, while not larger than some of the previous shows, was unusually interesting because of its attractiveness due to the arrangement of the individual exhibits and the wide variety of products and equipment shown. There was more equipment in operation than at previous shows. The attendance was unusually good and the exhibit brought out a great deal of favorable comment. As a reflection of the interest shown, considerable of the operating equipment was sold during the week.

Rustless Iron Products a Feature

Outstanding features included a number of exhibits of rustless iron and stainless steel, the nitriding process, nitrided products and the operation of tungsten-carbide cuttings tools. Conspicuous were the numerous showings of special steels, including various rolled and cast alloy steels. Among these were non-corrosive and heat-resisting alloys and alloys having other important qualities. These exhibits made an impressive picture of what has been accomplished in developing and turning to commercial application to serve industry rolled steel and castings of numerous alloys. Among materials not heretofore shown were attractive displays of table cutlery of stainless steel. Cooking utensils of rustless iron were also shown in several exhibits.

That rustless iron has broad commercial possibilities which manufacturers are rapidly developing was indicated by the wide range of this material shown in various rolled forms as well as in finished products for the auto-

New Officers for 1930

President: Robert G. Guthrie, metallurgist, Peoples Gas, Light & Coke Co., Chicago. He is now vice-president.

Vice-President: J. M. Watson, metallurgist, Hupp Motor Car Co., Detroit; he is now treasurer.

Treasurer: O. A. Fulton, Wheelock, Lovejoy & Co., Boston.

Director: W. B. Coleman of W. B. Coleman & Co., Philadelphia.

Director: Dr. O. E. Harder, professor of metallurgy, University of Minnesota, Minneapolis.

Secretary: W. H. Eisenman was reelected secretary for two years at the Philadelphia convention in 1928. The treasurer and the two directors are elected for two years; the others for one year.

motive and other fields. In the automotive field rustless iron stampings are finding a place as radiator and hub caps and for other bright finished parts. One exhibit that attracted considerable attention was the model of a window of rustless iron to be used on the Chrysler Building in New York. Aircraft steel was shown by several exhibitors, indicating the increasing commercial importance of that field. A foreign built automobile having 25 parts of nitrided nitralloy steel attracted much interest.

Tungsten-Carbide Tools in Action

The efficiency of tungsten-carbide cutting tools was demonstrated on two lathes equipped with these tools and remarkable speed records were attained during the tests, which attracted a great amount of interest. Carboloy tools were used on a Warner & Swasey turret lathe and Widia metal on a Monarch lathe.

Furnace Equipment Liberally Shown

The display of furnace equipment, both electric and gas, emphasized the importance of heat treatment in the metal-working industries. Many of the furnaces shown were under heat. These indicated that furnace manufacturers are constantly improving their equipment in the direction of closer temperature control and more efficient operation. The equipment included two electric furnaces for heating high-speed steel, which were provided with atmospheric control, a current of combusted gases being maintained across the furnace opening to prevent air from entering the work chamber and preventing scaling and pitting of the work. One nitriding furnace of the vertical cylindrical type was shown but this was not in operation.

In a space reserved for the American Gas Association there were 12 operating exhibits of gas-heating furnaces of various types and improved models. Furnace control and temperature recording equipment in the latest types were shown by a number of manufacturers. Various furnace accessories such as sheet metal carburizing boxes with welded joints, furnace trays, conveyor chain and belts, and furnace parts of different heat-resisting metals helped to make up a very complete and interesting display. About 7000 sq. ft. was devoted to gas furnaces.

Foundry Industry Represented

The progress that is being made by the foundry industry to broaden its field of usefulness was indicated in exhibits of iron, steel and non-ferrous castings. Castings were selected for exhibit by the Gray Iron Institute to show new uses and a wide range of uses for castings as well as the machinability of small castings. One exhibit that attracted particular interest was a headstone for a grave made of a light, hollow section of cast iron and enameled to give it the appearance of granite. This had a brass inset at the top which served as a name plate.

Developments in the electric furnace steel industry were well illustrated in a group exhibit by foundries of the Electric Steel Foundries Research Group. This included exhibits by several foundries of castings in both alloy and plain carbon steel for gears, fabricated and other work and physical test specimens. Among these were heat-treated chrome steel castings for teeth for an excavating dipper.

Aluminum and Zinc Products Displayed

Advances that have been made in the aluminum industry, particularly in finding new uses for its products, were indicated by a very comprehensive exhibit of aluminum castings, made in sand, dies and permanent molds. This exhibit also included products made of rolled and forged aluminum. That this industry is reaching into the building field is indicated by a display of spandrels and sills for buildings and radiator grills. A fabricated structural

Convention Items, "Quenched and Drawn"

GETTING the most out of conventions has certainly been developed by a plan of the International Harvester Co. It is the experience of some companies that the group of men which goes to such a gathering as that of last week does not get the most out of it in view of the expense involved—"too much visiting," "too many parties," "too little attendance of technical sessions," etc. This year the chief metallurgist of the Harvester organization designated a group of his men to attend. Each morning at a breakfast they assigned certain parts of the technical program and certain phases of the exposition for certain men to see. At the end of the day they assembled and talked over the entire experience—with evident mutual profit. Could not this plan be followed profitably by some other companies?

* * * * *

TOMBSTONES of cast iron—yes, this is a late development. In the booth of the Gray Iron Institute there was a small tombstone of gray iron enameled to imitate granite. Unless one knew how it was made, the disguise was good. A new industry?

* * * * *

OFFICERS of other technical societies not participating in the congress were seen here and there. C. E. Hoyt, executive secretary, and R. E. Kennedy, technical secretary, of the American Foundrymen's Association were present. The foundrymen will hold their annual convention and exposition in the same place the week of May 12, 1930. Most of the board of directors were in Cleveland for a meeting Sept. 12 and 13.

* * * * *

COMMITTEE meetings of two other technical organizations were held during the week. Several committees and subcommittees of the A. S. T. M. held routine sessions. There were also conferences of one or two committees of the A. F. A.

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HAS the A. S. S. T. a "main spring"? It certainly has in the person of its efficient secretary, William H. Eisenman. For 11 years he has been indefatigable in developing an organization having one chapter with 200 members to one of over 35 chapters with about 5900 members in units operating from coast to coast.

* * * * *

SOON after entering the main part of the Public Auditorium, where most of the steel company exhibits were located, the impressive figure of a portly and gaily decorated Indian effectively called attention to the exhibits of J. B. Ford & Co., Wyandotte, Mich.

THOSE in charge of technical sessions are to be commended on the manner and smoothness with which they were conducted. Excellent chairmen were provided, insuring the success of any such meeting. Liberal written discussions of most of the papers helped to keep the wheels turning and the interest keen.

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A NOVELTY in distributing favors was the presentation of a card entitling the one whose name appeared on the card to an airplane ride over Cleveland and vicinity in one of two planes owned by the General Alloys Co., Boston. The airplanes are six-passenger Stinson cabin monoplanes powered with Wright whirlwind engines, 220 and 300 hp. respectively. All flying was under the supervision of "Dal" Speer, assistant sales manager, G. A. Co.; he is a captain in the United States Air Service, has had 12 years flying experience and over 6000 air hours.

* * * * *

MANY a steel treater thought he saw a distinguished American diplomat in the corridors of the Hotel Cleveland. It was none other than the genial "Doc" Langenburg, whose resemblance to General Dawes is striking—particularly when he has that pipe (not underslung however) in action and his Fedora hat at the proper angle.

member for the Goodyear Zeppelin dirigible also attracted interest, as did a large ornamental street light bracket of cast aluminum.

Another field into which the aluminum industry has entered, as was shown by exhibits, is the manufacture of furniture. What can be accomplished in decorative work was shown by a spandrel made of an aluminum casting with enamel design baked on in colors. Another non-ferrous metal exhibit showed zinc products in die-castings and rolled form.

Welding machines of numerous types for various forms of welding were exhibited and indicated the carrying on of important development work in this field. Several were working units that attracted much attention. Numerous samples of welded joints were shown and these, with the welding machines and numerous exhibits of welding accessories, indicate the important place that welding has taken in the metal-working industry.

Welding and Other Machinery

Working exhibits included an automatic welding machine for pipe seam welding. Another operating unit was an automatic arc welder for welding circular joints, this being operated in adjoining pipe sections. Among interesting examples of welding was an airplane fuselage made of chrome-molybdenum tubing with welded joints, the welding of Ford car parts and the arc welding of thin sheets of steel and of aluminum and copper alloys. Displays of welding and cutting torches and accessories were numerous.

Machinery of various types was exhibited by a number of makers. These included die making machines, jig borers, punches and shears, drilling machines, sawing machines and polishing and grinding machines.

Many Steel Companies There

Many other important displays cannot be referred to in this necessarily brief report. It should be mentioned, however, that the exhibits of steel companies, both American and foreign, were more numerous and comprehensive than ever before.

Total space devoted to the National Metal Exposition was about 80,000 sq. ft. of which 20,000 sq. ft. mostly steel companies was in the main auditorium and 60,000 sq. ft. in the annex where the working exhibits were located.

Commercial Steel Treaters Organize

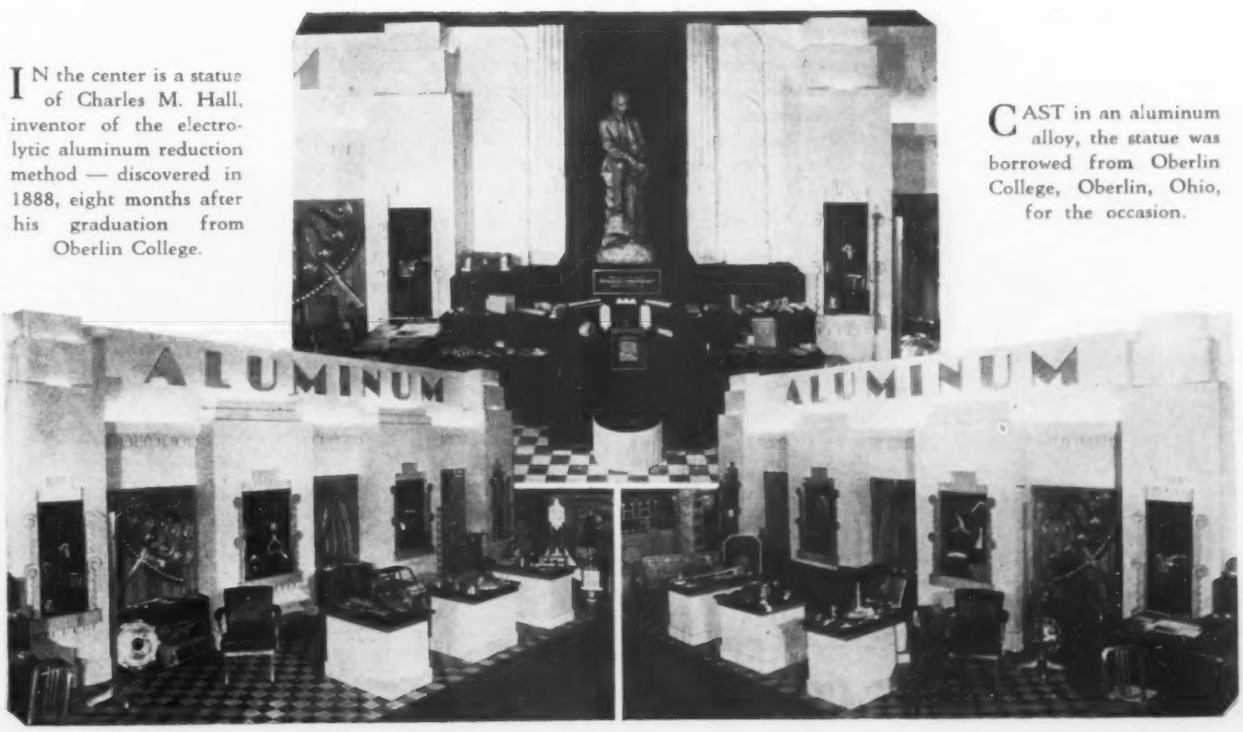
Several commercial heat treaters held a meeting in Cleveland last week during the Steel Treaters' Convention to discuss plans for a permanent organization with a view to cooperating in publicity and other work that would tend to serve their industry. Those present were Theodore Barker, president Accurate Steel Treating Co., Chicago; O. T. Muelemeyer, O. T. Muelemeyer Co., Rockford, Ill.; President Lindberg of the Lindberg Steel Treating Co., Chicago; A. D. Bach, president New England Metallurgical Corporation, South Boston, Mass.; C. W. Derhammer, Lakeside Steel Improvement Co., Cleveland; N. M. Salkover, vice-president, Queen City Steel Treating Co., Cincinnati, and Stanley P. Rockwell, S. P. Rockwell Co., Hartford, Conn. Other commercial steel treaters who might be interested in joining an association are invited to get in touch with any of the men who attended the Cleveland meeting.

British Researches In Metals

Important metallurgical researches under way at the National Physical Laboratory, Teddington, England, include a search for a stainless iron-nickel-chromium suitable for castings; a microscopic examination of specimens in a vacuum under high temperature and load (creep); a study of the effect of gases on the solidification of steel ingots; the determination of the equilibrium systems iron-silicon and iron-manganese; and the effect of considerable quantities of phosphorus, arsenic, bismuth and antimony upon copper.

Impressive Display of Progress in Aluminum

IN the center is a statue of Charles M. Hall, inventor of the electrolytic aluminum reduction method — discovered in 1888, eight months after his graduation from Oberlin College.



CAST in an aluminum alloy, the statue was borrowed from Oberlin College, Oberlin, Ohio, for the occasion.

Notable Symposium on Nitriding

Dr. Fry, German Originator of Process, Discusses Recent Developments, and Eight Americans Contribute Results at Valuable Session of Steel Treaters

HARDENING steel with ammonia gas, or nitriding, was given special prominence at the National Metal Congress last week at Cleveland. With the German originator of the new process and the French promoter of its commercial use outside of Germany both present, unusual color was lent to the symposium on the subject that was held Sept. 13. It was a rare one-topic technical program even for the American Society for Steel Treating. Besides eight papers by Americans who have been working on the process, there was an address by Dr. Adolph Fry, Krupp Laboratories, Essen, Germany, and brief remarks by Dr. Paul Aubert, Aubert Frères & Duval, Paris, France.

That there is keen interest in this subject is evident from the attendance—at least 600 at the morning session in the ballroom of the Hotel Cleveland and over 400 at the afternoon session in a special room in the Public Auditorium. Contributing materially to the success was the efficient guidance of the sessions by the two chairmen, Dr. George B. Waterhouse, professor of metallurgy, Massachusetts Institute of Technology, Cambridge, Mass., and H. J. French, metallurgist, International Nickel Co., Bayonne, N. J. In this report it is possible to touch only on a few of the chief points brought out by the papers and the many discussions. The entire proceedings are to be issued by the A. S. S. T. as a special edition of the *Transactions* within the next six weeks; no papers were preprinted.

Nature of the White Layer in Gun Tubes

Not until nitriding was studied was it really known what causes the hard layer inside of large guns after firing, said Dr. H. H. Lester, Watertown Arsenal, Watertown, Mass., in opening the program with his paper "The White Layer in Gun Tubes." This hardness is caused partly by solution of the nitrogen in the steel. It is possible to have an austenitic nitride case. This case has possibilities of superior characteristics; it is tougher and more adherent. The austenitic case may be obtained with other than aluminum steels. Dr. Lester expresses the opinion that by proper cooling the case may be martensitic and that it may be subsequently tempered to give desired characteristics. Many slides were shown of the layer and structure in gun tubes.

Both Dr. V. O. Homerberg and Dr. John P. Walsted of the Massachusetts Institute of Technology said that Dr. Lester's views are confirmed by their own laboratory work and that the white layer is due to a solution of the nitrogen.

Besides a paper by Dr. Fry, not scheduled, three contributions were read and all were discussed together. The three papers were: "Observations in the Iron-Nitrogen System" by Samuel Epstein, Illinois Steel Co., South Chicago, Ill.; "A Study of the Nitriding Process" by Prof. V. O. Homerberg, and Dr. John P. Walsted, Massachusetts Institute of Technology; and "Researches in Nitriding Steels" by Prof. O. E. Harder, J. T. Gow and L. A. Willey, University of Minnesota.

Dr. Fry Offers Latest Developments

All results of investigations here thus far are in agreement with those in Europe, said Dr. Fry in his interesting address. When nitriding is properly carried out, certain hardness with no distortion is achieved. The physical properties of the core are not changed and the hardness and wear-resistance are higher than by any other process. Hardness is not injured by drawing to even above 950 deg. Fahr., and nitrided parts are free from internal stresses and aging effects, and are rustless. The process is adopted to various applications having varying requirements—select the nitralloy of proper composition. Best results are obtained by quenching and tempering the raw material, then by machining and nitriding.

Conditions which should be avoided, continued Dr.

ADOLPH FRY

PAUL AUBERT

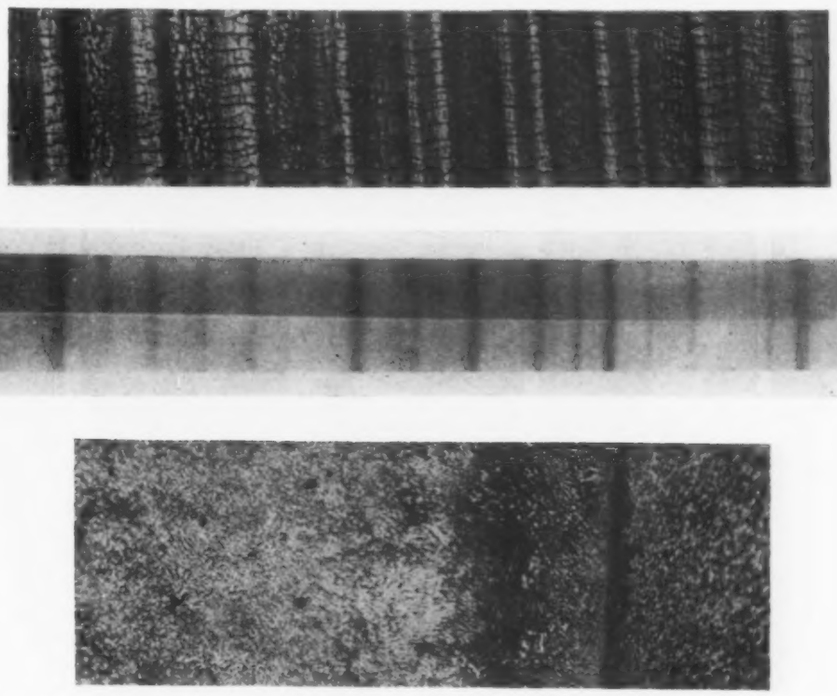
C. K. EVERITT

Three Visitors from Abroad to the Symposium

Dr. Fry of Germany Is the Originator of the Nitriding Process

Paul Aubert of France Is the Commercial Developer of the Method

C. K. Everitt of England, Producer of Special Alloy Steels, Addressed the Symposium



Section of Trepanned Ring (Upper) Taken from Bore of 12-In. Gun, Photographed at Natural Size
X-Ray Diffraction Spectrum (Center of the White Layer of a 12-In. Gun Tube
Nitride Case from Outer Surface (Lower) of 50-Calibre Rifle Barrel, x 100.
(All from Doctor Lester's Paper)

Fry, are: Surface oxidation; foreign metals touching the nitralloy, such as nickel not saturated with nitrogen; and foreign substances in the ammonia, such as air or water.

Some points not yet in agreement, said Dr. Fry, are: Experiments with higher pressures must be carried out in more detail; higher nitriding temperatures shorten the time of nitriding but will entail disadvantages and may even be dangerous.

Nitriding Not Yet Fully Explained

There is not yet a complete and well substantiated explanation for nitriding hardness, said Dr. Fry, who advocated the use of all researchers of the Vickers or Firth figures. Continuing to discuss the theory, he said that the hardness of the nitrided layer is not to be attributed to the hardness of the alloy nitrides themselves. It may be suggested with some assurance that the mechanism of the nitrogen hardening bears some resemblance to quenching and hardening steels in so far as both seem to be caused by space lattice distortion.

Practical Problems Outlined

Among practical problems of nitriding, the German inventor enumerated the following: Getting more experience in choosing the best nitralloy for each purpose. Machining of nitralloy with even higher core strength without leaving machining stresses. Making drop forgings and hot-pressed pieces free of surface oxidation which would otherwise cause inferior quality of the nitrided layer. Research on nitriding cast iron. Catalysts as nitriding agents.

Abstracts which would do justice to the three authors enumerated above are not possible here. They will be printed in an early issue. In Mr. Epstein's paper a tentative diagram of the Fe-Ni system has been drawn in which modifications of the two existing diagrams by Fry and Sawyer are proposed. Dr. Homerberg's splendid contribution is mainly a study of four steels selected for investigation of the influence of nitriding on the core properties. It is shown that the reduction of impact value is not due to the presence of nickel and that molybdenum as an alloying element is valuable in preventing the reduction of impact resistance. Some fine slides of photomicrographs of case and cores with superior structures were shown, resulting from various heat treatments. Dr. Harder's excellent paper presents a comprehensive study of the availability of a long series of steels, alloy and non-alloy, for nitriding.

Prominent British Metallurgist Speaks

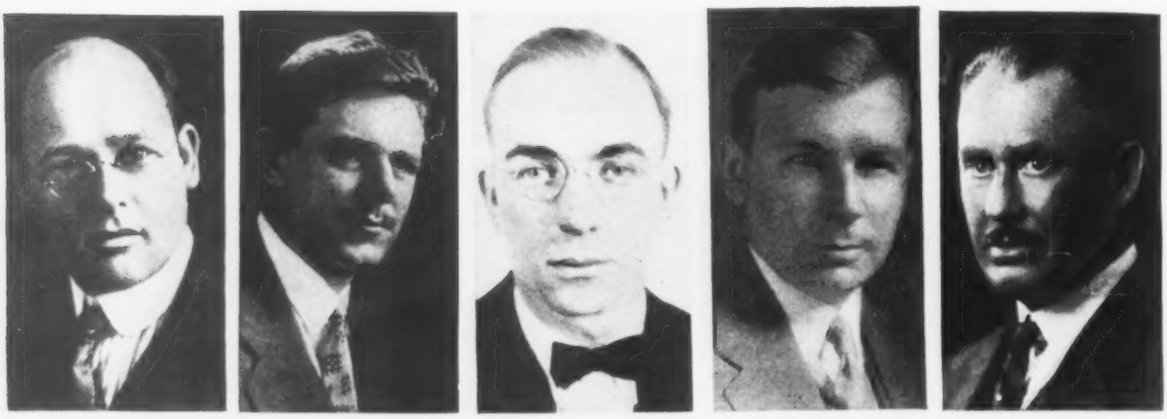
Before the close of the morning session Dr. Waterhouse called to the platform a prominent English metallurgist visiting the National Metal Exposition—C. K. Everitt, managing director and works manager, Edgar Allen & Co., Ltd., Sheffield, England.

Apart from the advantages of hardening by nitriding with the elimination of distortion, Mr. Everitt said he was not sure that the older processes did not possess some advantages in the fact that rolling and wearing parts require grinding.

High-Frequency Furnace Commended

The call for alloy steels is tremendous and in this field the high-frequency electric furnace is to be a large factor. The Edgar Allen company was one of the first to install this unit on a commercial scale, he said, and it has been found very valuable commercially and experimentally. It is extremely useful for higher alloy steels. A 600-lb. furnace is making 30 to 40 tons of high-grade steels per week at Sheffield and the ingots range in size from 3 in. to 6 in. square. It is economical; about 830 kwhr. is the experience per ton of steel. "I want to

American Sontributors on Nitriding of Steel



HORACE H. LESTER | A. B. KINZEL | ROBERT SERGESON | JOHN P. WALSTED | O. E. HARDER

testify to the practical usefulness of such a convention and exposition as this and am glad to be present. After my last visit of six years ago, I note great progress in your wonderful country."

Other Phases of Nitriding

INTRODUCING the afternoon session two of the four papers were presented first: "Investigations in Nitriding" by Robert Sergeson, Central Alloy Steel Corporation, Canton, Ohio, and "A Few Practical Fundamentals of the Nitriding Process" by H. W. McQuaid, Timken-Detroit Axle Co., Detroit.

New data are offered by Mr. Sergeson as to the effect of (1) increased flow of ammonia gas, (3) effect of increase of nitriding temperature in lowering hardness of the case, (3) effect of varying aluminum content, (4) effect of nickel, and (5) duplex methods of nitriding. A method of removing brittleness is made public. Nitrided and carburized cases are compared in respect to hardness penetration and effect of reheating temperatures on the hardness of the case.

Nitriding Plain Carbon Steels Possible

Plain carbon steels can be nitrided just as hard as nitralloy steels was the surprising statement of Mr. McQuaid. Desiring materials better than the case-hardened, Mr. McQuaid said his company approached the subject from the users' standpoint. Nitralloy steels can be nitrided commercially so that they are superior to carburized steels, except in machinability. They are all white hard, resist corrosion, do not distort and possess high impact values. Stainless steels cost 20c. to 30c. per lb. while nitrided are 7c. to 12c. per lb. There is no loss due to grinding cracks. His plant is operating night and day on nitriding plain carbon and other steels. The steel must be put in the sorbitic condition but nitriding steels require higher temperatures and a severer quench. Mr. McQuaid said he was an advocate of duplex nitriding—at high, then low temperatures.

New Etching Solution Explained

A new etching medium which he claims brings out better the constituents of nitrided steels was mentioned by A. B. Kinzel, Union Carbide & Carbon Research Laboratories, Long Island City, N. Y. It is, briefly, absolute alcohol with enough water to hold copper sulphate and copper chloride in solution. It is slightly acidulated.

Pointing out the remarkable parallelism of effort revealed by the papers, G. H. Eaton, Molybdenum Corporation of America, Pittsburgh, made a plea for the parcelling out of various lines of work and recommended careful check of all work by duplicate tests, suspecting that this had not always been the case. It was announced that a committee, with Dr. Homerberg as chairman, had been appointed with the aim of systematizing all investigation.

Some interesting observations were made by Sam Tour, New York. In his war and post-war experience it had fallen to his lot to try to find a steel that would stand up in the reaction chambers of synthetic ammonia plants—evidently the nitride case breaks down after heat treating following nitriding. Also impurities in the ammonia should be guarded against.

That nitrided steels containing inclusions result in pitting was the experience of V. T. Malcolm, Chapman Valve Mfg. Co., Indian Orchard, Mass., as well as their corrosion in ordinary tap water. Suitable nitralloy steel properly nitrided, he testified to as very valuable in high temperature, high pressure steam valve applications, and showed on the screen many views of nitrided products and their long life.

Short-Time Nitriding in Molten Salts

SPEEDING up the nitriding of steel was dwelt upon by A. B. Kinzel and J. J. Eagen, Union Carbide & Carbon Research Laboratories, in a paper "Short-Time Nitriding of Steels in Molten Cyanides." The authors claim good results in much less time than the 90 hr. for ammonia nitriding by nitrogen concentration and close contact. Liquid media were investigated and a mixture of sodium and potassium (53 per cent) used. Very satisfactory results are claimed with a case of 0.005 in. obtained in one to two hours. In wear tests some of his products under corrosive conditions have exceeded 66,000,000 revolutions as compared with failures of carbon steels at 17,000,000 revolutions. The authors claim the case obtainable to be three times as hard as that by the ammonia hardening.

The last claim was taken exception to by Dr. Homerberg who pointed out that with a Brinell hardness of 1000 with ammonia, it was impossible to increase this threefold. To this Mr. Kinzel replied that everything depends on the method of testing the hardness. As to a criticism that the same results would not be obtained with commercial salts as contrasted with the pure salts used by

the authors, Mr. Kinzel stated that equally good results had been secured with regular products.

Practical Use of Nitrided Products

Some important practical applications of nitrided products were described by V. T. Malcolm, Chapman Valve Mfg. Co., in a paper which closed the symposium—"Using Nitrided Steels in High Temperature, High Pressure Service." The author's experience with these steels has evidently been broad. He threw on the screen numerous views of the successful use of nitrided valve rings and other parts which had outlasted some other materials such as rustless iron. He declared that nitrided steels do resist corrosion at high temperatures and high pressures and are very hard. Their chemical stability is a property and their resistance to wear, abrasion and erosion is unquestioned in his experience. These steels combine hardness and toughness with extreme hardness on the outside and are suitable for valve rings and disks. Such steel is machined before treatment and not ground.

Welders Devise Non-Destructive Tests

Methods Described Whereby Strength of Joint May Be Investigated Without Pulling It Apart—Welding of Pressure Drums and Thin Sheets Also Discussed

TWO features of the fall meeting of the American Welding Society are of note. One is the evident progress toward the solution of the problem of non-destructive tests, and the second is the number of contributions from university laboratories and research students. Beyond these were the many technical and committee meetings, the exhibit (held in conjunction with the Steel Treaters), and the usual social functions. Perhaps the two features mentioned above are evidences of one main line of progress toward reliable joints by welding. At any rate, time was not so long ago that the welding fraternity discouraged and discounted heavily any work done in academic circles because of the suspicion that the joints made by unknown welders might not be representative of what could be expected in standardized practice.

Portable Testing Machine for Pipe Joints

F. G. Tatnall, Southwark Foundry & Machine Co., Philadelphia, read a paper on "How to Test Welds," in which he discussed the tensile test as made by a hydraulic testing machine and recorded electrically on a Leeds & Northrup potentiometer and the bend extensometer described in THE IRON AGE, Sept. 6, 1928, page 575. Other devices for recording at a distance by telemeter were described in detail. But it was pointed out from the floor that tests of completed structures, whether welded or made by any other means, are properly the function of the designing engineer or the architect representing the owner. Furthermore, such details as the speed of testing should be resigned to the materials testing specialist. Welding engineers should be primarily interested in testing the qualities of the welded joint, and these tests should simulate as nearly as possible the strains which must be resisted by the weld metal in service. In other words, pipe joints should be tested in tension, structural joints ordinarily in shear and so on.

A tension testing machine, portable enough to be taken into the field, and rugged enough to stand rough treatment, has been developed by Mr. Tatnall's firm in conjunction with Union Carbide & Carbon Research Laboratories. It is contained in a shortened oxygen cylinder. One end contains a hydraulic pump, hand operated, which exerts stress on the specimen by means of suitable spherical clamps. A hinged door is cut into the side of the cylinder, permitting the test specimen to be inserted in the grips. Stress is read from a removable pressure gage. The whole machine weighs about 200 lb., and has an accuracy of about 2 per cent even after having been dropped 5 ft. on a concrete floor. It is designed to be taken into the oil fields and test coupons cut from steel pipe joints by a portable milling machine. (The slots in the pipe are later welded shut.) In this way any suspicious joint can be checked immediately, and if necessary the welder's work corrected. It was noted, however, that the welding of slots in closed pipes was liable to introduce strains of greater moment than the defect which might be discovered, and consequently the use of field testing should be confined to the occasional task of checking, at irregular intervals, the work of qualified welders and inspectors.

Detecting Flaws With Heavy Electrical Currents

Elmer A. Sperry, president American Society of Mechanical Engineers, wrote a paper for this meeting entitled "Non-Destructive Testing of Welds," in which he described a machine built along the lines of the one for detecting rail fissures* but adopted for boiler drums. Reference to the citations will show that the machine includes a powerful direct current generator, which by means of suitable contact brushes passes several thousand amperes of low voltage current through the metal to be tested. Three lighter contacts set fairly close together by-pass a little of this current if deflected by an internal flaw, and these variable currents are magnified by familiar vacuum tubes until they are powerful enough to throw aside a stylus on a recording chart.

While the machine is still in experimental development for welded joints in steel plates, it has great possibilities as proved by its success when mounted in an inspection car and used for detecting internal fissures in railroad rails. It can detect openings of microscopic width; thus, the surfaces of contact between a pair of Johannsen blocks, held together with 5000 lb. pressure, gave a resistance per unit length 175 times that of the sound metal.

"Listening-In" on Defects

A simple scheme for testing welds without destroying them was described by C. O. Burgess, A. B. Kinzel and A. R. Lytle, Union Carbide & Carbon Research Laboratories, Long Island City, N. Y. ("Non-Destructive Testing of Welds with the Stethoscope and X-Ray"). It merely consists of a physician's stethoscope and a peen hammer. The observer taps the plate or joint, systematically covering the area, and listening to the tone emitted through the stethoscope. According to the authors, the quality of tone is such that fairly small internal defects may be spotted, and is so definite in nature that various laboratory men with no previous experience with the method were able to duplicate each

*See THE IRON AGE, Oct. 11, 1928, page 907; Nov. 1, 1928, page 1089; Nov. 15, 1928, page 1214.

other's operations. A number of plates welded by student members were explored in this way, and then the joints X-rayed at the suspected spots. In all cases flaws were shown on the films, either when the rays penetrated parallel to the scarf or perpendicular to the plate Sufficient experience has been had with the combined method—stethoscope and X-ray—so that the authors are able to predict the strength of a welded joint containing slight defects within an accuracy of 3000 lb. per sq. in.

Boiler Code to Be Liberalized

This progress toward the non-destructive testing of welds was pronounced by C. W. Obert, secretary of the American Society of Mechanical Engineers' Boiler Code Committee, to be one impressive factor which will enable welding to rise above its present limitations as a joint for pressure vessels. This remark was made in discussing a brief paper on "Foreign Practice in Welding of Boiler Tubes and Drums" by G. A. Orrok. Mr. Orrok reports that high pressure shells are usually hammer welded up to 2 in. wall thickness. Boiler drums with forged ends welded with the oxy-acetylene process are quite common.

Both gas and electric welding are used for penstocks, which are welded as a rule. European boiler makers are apparently adopting welding and cutting as production tools at a rapid rate, and Mr. Orrok mentions particularly that the two objections commonly heard of late years, namely, the lack of resiliency in weld metal and the variation in welder's skill, are heard less and less often, due to improved methods of welding, proper inspection, accumulated experience and the large amount of test data.

Further in commenting upon these European conditions, Mr. Obert said that the Boiler Code Committee is about ready to promulgate a revision of the unfired pressure vessel code, allowing all-welded drums up to 60 in. diameter, 200 lb. pressure, and stress on butt welds a maximum of 8000 lb. per sq. in. These revisions have been made after receiving the cooperation of a committee from the American Welding Society. The latter was able to submit recommended procedures for manual welding by both gas and arc process which, if followed, would in all probability produce an eminently satisfactory joint.

At the present time, however, welding seems to have 1½ in. plate as a maximum limit; forged drums are very expensive, consequently the field is open for fusion welding. In Mr. Obert's opinion, automatic arc welded drums would be admitted within the provisions of the code as soon as the Welding Society could propose a recommended procedure. This has been hampered so far by the secrecy of the firms who have been successful in this line.

Correcting Magnetic Blow When Welding Thin Sheets

W. L. Warner, General Electric Co., Schenectady, N. Y., presented an interesting discussion of "Automatic Arc Welding of Thin Sheets." It is known that a good butt joint is difficult to make by arc welding in sheets of 12 to 14 gage, because the arc burns holes in the metal if the travel is slow enough to give sufficient time to melt and alloy the abutting edges. In order to keep the work in line and prevent distortion, rigid clamps and a backing bar are required. These necessary adjuncts introduce serious magnetic field, induced by the welding current, which cause marked instability in the flame, pulling it forward at the beginning of the seam, and blowing it backward at the end.

Mr. Warner described a device to correct this in the form of an insulated conductor loop placed close up to the under side of the copper backing bar. The operator sends a certain portion of the welding current through this loop, regulating its intensity sufficiently to counteract the "blow" mentioned below. By this device, clean steel sheet with carbon less than 0.25 per cent can be welded commercially into a joint of 85 per cent efficiency. Fourteen gage has thus been welded at a speed of 29 in. per minute (speed on 14 gage range boilers is about 16 in. per minute). Sixteen gage butt welding is about the mimimum limit for butt welds, although 4-ply edge welds on 18 gage stampings for automatic mufflers are being welded at 50 in. per minute.

It is not always necessary to weld clear through to the bottom of the seam. For instance, banjo rear axle housings for light cars are made from 3/16-in. stampings. Welds at the rate of 22 in. per min. are made, with only two-thirds penetration, since it is found that such a joint is oil tight and sufficiently strong. Galvanized iron may also be welded at high speed and partial penetration in order to avoid volatilizing all the protective zinc on the inside of the seam.

Manually, this magnetic blow may be corrected in several ways, as noted by different commentators. The simplest is to hold the electrode in such a way that it points in the direction of blow. Magnetic blow does not exist in fillet welds; in butt welds it can also be minimized by tack-welding the joint at the ends, thus closing the magnetic circuit, or by running a light bead on the back side of the joint. Or, as other speakers remarked, it might be avoided altogether by the use of atomic hydrogen or oxy-acetylene welding.

Corrosion of Steels and Irons in Sea Water

Five years ago the British Institution of Civil Engineers caused to be exposed in four marine locations several concrete frames containing bars and assemblies of commercial construction materials. Three identical frames were in each exposure, one to be examined after five years, the next after 10, and the last after 15. A report has now been issued in which Dr. J. Newton Friend discusses the results of the five-year tests.

In detail many differences in the behavior of the metal have been observed. Thus at Colombo the completely submerged bars corroded about 10 per cent more than at Plymouth, but in alternate wet and dry exposures the ratio of corrosion was anything from three to six times, and the air exposures 10 times as great.

The most resistant alloy tried was the 36 per cent nickel steel; next is usually the 13.5 per cent chromium steel (although in wet and dry exposure at Colombo this was virtually destroyed by localized corrosion). Cast iron is nearly as good as these two in most exposures. Additions of ½ and 2 per cent copper were also very effective.

Data on Chains and Belts for Conveyors

A comprehensive general catalog, No. 330, has been issued by the Chain Belt Co., Milwaukee, in a book of more than 800 pages measuring 7½ x 10½ in. This gives a great amount of information, with illustrations, pertaining to the products manufactured by both the Chain Belt Co. and its subsidiary, Stearns Conveyor Co. Many of the illustrations show installations of the equipment manufactured, and the list of industries served is impressive. Other illustrations, and they are numerous, show parts of the equipment in conjunction with tables of dimensions, prices, code numbers and other pertinent data.

Nearly 250 pages are taken up with the description and information regarding chains and sprocket wheels. Belt power transmission, gearing of various types, shafting, clutches, bearings, elevator buckets and bucket elevators, skip hoists, hoppers and feeders, apron and pan conveyors, belt conveyors, screw conveyors, slat conveyors and many auxiliary features follow. Overhead suspended conveyors are given a section, while those specially devoted to foundry use are handled separately. A 14-page index completes the work.

Second Machine Tool Exposition Will Have Many New Developments

WITH the machines and other products of some 240 companies on display in almost 100,000 sq. ft. of floor space, and with many new developments, amounting in some cases to innovations, the second National Machine Tool Builders' Exposition to be held in the Public Auditorium, Cleveland, Sept. 30-Oct. 4 should prove even more interesting and profitable to metal-working executives than the 1927 exposition.

Floor space occupied, both gross and net, and the number of exhibitors are larger than previously by some 30 per cent. The gross floor space this year totals more than 136,000 sq. ft. At the first show more than 500 machines were in operation and there were extensive displays of small tools, gages and other equipment; this year's show will be larger in both respects. Machinery will be tooled for production work on automobile, airplane engine, locomotive and other parts, and machine tool executives, designers, and others in attendance will exceed 3000.

Although the past two years have been a busy period for most machine tool builders, it will be evident that development work has not been neglected. On the whole, equipment is heavier, more powerful and faster, has more automatic features and is handier to operate than even a few years ago. Flexibility, enabling convenient change-over for mass production of different pieces, is notable in many lines. Hydraulic feeds are increasingly applied, and their use extended to at least one automatic lathe. Ball and roller bearings are even more widely used than heretofore, and automatic lubrication is applied wherever possible.

Then there is the tungsten carbide cutting tool, with its full production possibilities still a matter of investigation. Comprehensive data regarding application of this material may be had at the Show, not only from manufacturers who will display and demonstrate these tools in turning and other operations, but from makers of small tools and from a number of machine tool builders who have experimented with these tools in connection with their own machines.

The Machine Tool Congress, the production group of the Society of Automotive Engineers, and the machine-shop practice division of the American Society of Mechanical Engineers will hold technical sessions in Cleveland during the week of the exposition.

Some of the equipment to be exhibited is briefly described and illustrated in following pages. A list of companies exhibiting, with enumeration of products to be shown and names of representatives in attendance, is also given. Other new developments seen at the Show will be included in forthcoming issues of THE IRON AGE.

Exhibitors and Products to be Shown at Machine Tool Exposition

A

Abrasive Machine Tool Co., East Providence, R. I. Booth 2W 5.
No. 3 surface grinder, 22 x 8 x 12 in.; No. 33 surface grinder, vertical spindle, 22 x 7 x 12 in.; No. 5 surface grinder, 48 x 14 x 14 in.; dust exhaust attachment; wet grinding attachment; magnetic chucks; self-contained d. c. generator; dial test indicator; 8 in. index centers; 8 in. semi-direct index centers. Represented by: F. N. MacLeod, N. D. MacLeod, C. G. MacLeod, K. B. MacLeod, W. Sceeles, E. S. Cornell.

Acme Machinery Co., Cleveland. Booth 2D 5.
Acme all-steel bolt heading, upsetting and forging machine; bolt threading machine, cutting standard style of thread; semi-automatic nut threading machine; nutting-up machine. Represented by: H. N. Anderson, sales manager; R. D. Davies, secretary and treasurer; K. F. Bruch, vice-president.

Acme Machine Tool Co., Cincinnati. Booth 2B 14.
17 and 4½ in. Cincinnati Acme full universal hexagon turret lathe; No. 1 Cincinnati Acme semi-universal hexagon turret lathe. Represented by: Charles Meier, Fred Winkelman, W. Behrens, H. V. Myers, Lee G. Leon.

Ahlberg Bearing Co., 317 East Twenty-ninth Street, Chicago. Booth 4W 10.
"CJB" Master ball bearings; Ahlberg ground bearings. Represented by: C. J. Bender, president; G. L. McGregor, assistant sales manager; B. B. Clark and R. H. Kelly, district sales managers; B. S. Okner, chief engineer.

Charles G. Allen Co., Barre, Mass. Booth 1W 11.
Sensitive ball bearing drilling and tapping machines. Represented by Charles G. Allen, Charles G. Allen, Jr.; John S. Wecks.

Allis-Chalmers Mfg. Co., Milwaukee. Booth 5C 11.
"Texrope" speed reduction unit in operation; totally inclosed fan cooled motor; squirrel case induction motor; d. c. machine tool motor. Represented by: A. H. Wyman, district manager; V. E. Walters, W. F. Sheriff, M. V. Bailliere; F. A. Miller, salesman, Cleveland district; L. E. Grothaus, assistant manager, electrical department, Milwaukee; J. C. Rattermann, assistant manager, electrical department, Norwood, Ohio; Walter Geist, assistant manager, milling department, Milwaukee.

American Broach & Machine Co., Ann Arbor, Mich. Booth 1W 22.
Hydraulic, vertical and horizontal broaching machines; broaching tools; hydraulic presses. Represented by: Francis J. Lapointe, president; David A. DeLong, secretary; J. A. Livingstone, sales representative; William Pfeil, tool designer; J. E. Jones, engineer.

American Tool Works Co., Cincinnati. Booth 2D 3.
Lathes, radial drills, shapers—all motor driven. Represented by: J. B. Doan, president and general manager; A. E. Robinson, works manager; R. S. Alter, vice-president and foreign manager; L. W. Scott Alter, assistant to president; J. C. Hussey, sales manager; H. W. Schatz, Eastern sales manager; D. M. Bartlett, C. H. Cormany.

Armstrong-Blum Mfg. Co., Chicago. Booth 4A 5.
Marvel metal band sawing machine; automatic high-speed saw; hack sawing machines; high-speed edge hack saw blades. Represented by: Harry J. Blum, George J. Blum, Fred J. Blum, Stanley A. Woleben, H. Conrad, Walter S. Ryan, J. E. Van Doren.

Armstrong Brothers Tool Co., 317 North Francisco Avenue, Chicago. Booth 4C 2.
Lathe, planer and shaper tools; lathe dogs; clamps; ratchet drills; drop forged wrenches; pipe vises; pipe cutters; stocks and dies; pipe wrenches; machine shop specialties. Represented by: Horace Armstrong, A. Arbogast, S. W. Welter, George Nufer.

Arter Grinding Machine Co., Worcester, Mass. Booth 1W 8.
12-in. rotary surface grinder with magnetic chuck, wet grinding equipment, including pump and tank, arranged for motor drive complete with motor; No. 132 automatic cylindrical grinder with wet grinding equipment including pump and tank, with complete tooling for grinding valve stem guides, arranged for motor drive complete with motor. Represented by: William Arter, president; Warren F. Fraser, works manager; Albert B. O'Donnell, sales manager.

Associated Machine Tool Dealers, 551 Washington Boulevard, Chicago. Booth 2W 0.

E. C. Atkins & Co., Indianapolis. Booth 5C 6.
No. 18 "Kwik-Kut" power hacksaw; No. 7 Kwik-Kut power hacksaw; No. 4 metal cutting bandsaw; Silver-Steel hack-

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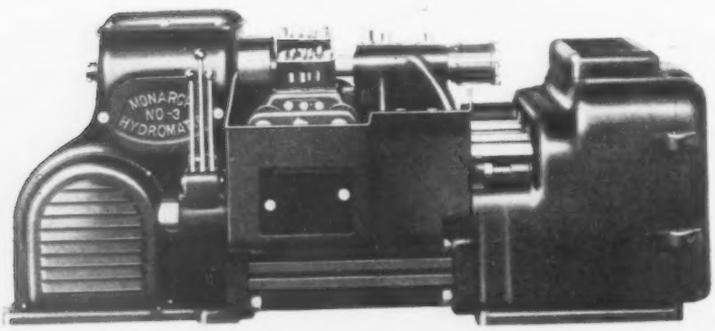
Automatic Lathe with Hydraulic Feeds



AN automatic lathe featuring hydraulically-actuated carriages and tool slides and simplified mechanical construction, resulting in increased production and lower unit cost, will be introduced by the Monarch Machine Tool Co., Sidney, Ohio. Cams and feed gears are eliminated and the carriages and tool slides travel on round steel bars instead of the usual cast iron ways.

The feed cycle, consisting of rapid approach to the work, feed at a predetermined rate or rates, and rapid return to the starting position, is automatically controlled. Positive adjustable diameter and length stops facilitate accurate duplication of cuts.

The headstock unit is a separate casting and houses the motor, which drives the spindle through silent chain or belt, multiple-disk clutch, worm gearing and pick-off change gears at the front of the headstock. Timken roller bearings are used throughout, and all revolving parts dip in oil. In the headstock is an 80-gal. per min. coolant pump, driven from the main motor. One lever starts and stops the spindle, coolant pump and hydraulic feed of both carriages. The middle section of the machine contains a large cast iron chip pan and coolant reservoir and is keyed and bolted to the head stock and tail-end housing. The latter houses the hydraulic mechanism, including two Oilgear hydraulic pumps, driven by a single 2-hp. motor, which is readily accessible through large doors at the end.

Each carriage is mounted on a 5-in. and a 6-in. diameter steel bar, the former on the outside and the latter on the inside. The 6-in. bars are anchored in the head and tail housings, while the 5-in. bars are slidably mounted in bushings in the same housings, the carriages being clamped to them. This provides wide area of support and prevents cocking or twisting of the carriage under heavy cuts.

Tool slides are supported on two round hardened steel bars and have split adjustable taper bushings to compensate for wear. The cross-feed hydraulic cylinder is located between the two tool slide supporting bars. Either tool slide can be reversed instantly and returned to the starting position from any point in the cycle. The tailstock clamps on the two inside 6-in. diameter bars on which the carriages slide.

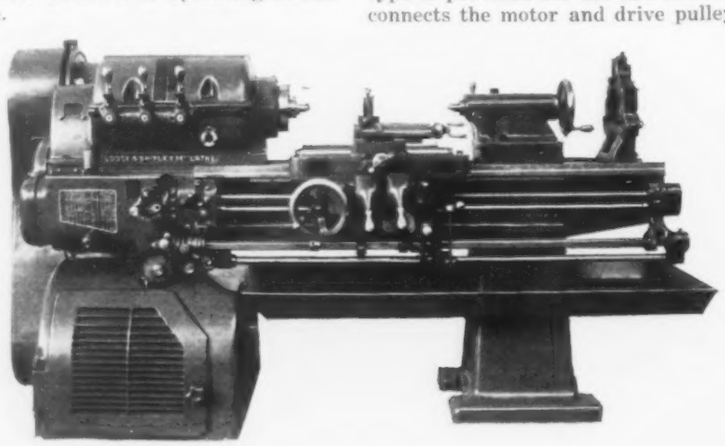
The hydraulic feeds provide unusual flexibility, and because of their cushioning effect more pieces are produced between tool grinds. Quicker set-up and change from one job to another permits the machine to be used economically for short runs. It is also stated that heavier cuts can be taken than usual on a machine of this type, and the high spindle speeds and rugged construction adapt the machine for tungsten-carbide cutting tools.

Improved 14-In. Selective-Head Engine Lathe

IMPROVEMENTS intended to facilitate operation, both in manufacturing and tool room work, have been incorporated in a new 14-in. selective-head engine lathe of the Lodge & Shipley Machine Tool Co., Cincinnati. The machine is of generous size, the swing over the bed being 16½ in. and over the carriage, 10½ in.

Twelve spindle speeds are obtainable through gears sliding on splined shafts. There are only 12 gears, all of which are hardened. In addition to the spindle, there are only two shafts in the headstock, and these are carried on ball bearings. All of the mechanism is located in the lower section of the headstock. Gears run in oil, the splash system being supplemented by a pump that drenches the entire interior of the headstock, including the white-metal spindle bearings. The headstock pulley has an improved type of disk clutch, which is operated by levers at the apron and at the headstock. A new feature is the reverse to the lead-screw operated by a lever at the right of the apron. The lead-screw and feed rod can be thrown out of use through a clutch at the feed box end so that only one of these members is operating at one time.

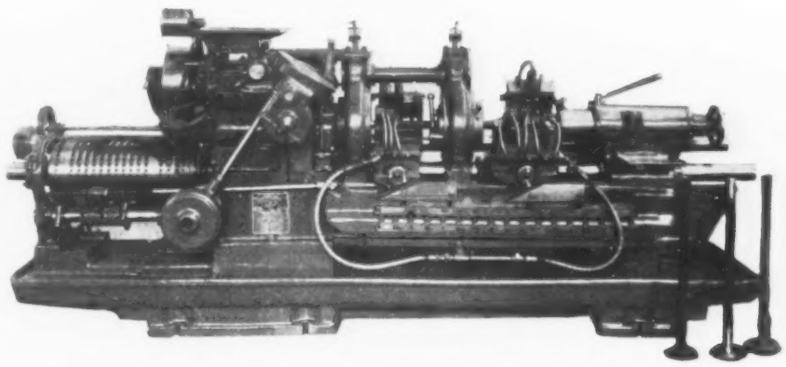
The motor base of the machine houses the motor at the rear, and a compartment, reached through a large door at the front, incloses the starting equipment. An automatic belt tightener of weighted idler pulley type is provided for the flat belt that connects the motor and drive pulleys.



Fay Automatic Lathe with Center Drive

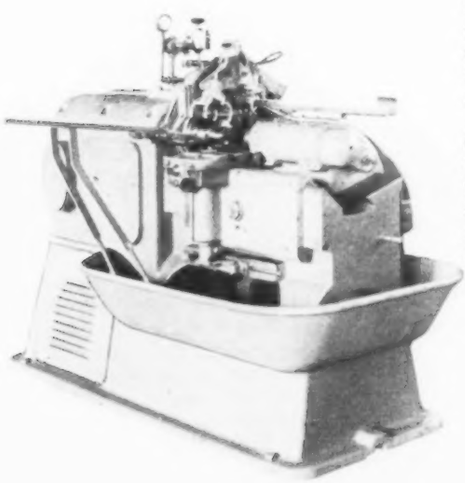
A 14 x 50-in. Fay automatic lathe equipped with center drive, as illustrated, and tooled to machine both ends of a rear axle shaft simultaneously, will be demonstrated by the Jones & Lamson Machine Co., Springfield, Vt.

Two of the new 24-in. Fay automatics, described at length in THE IRON AGE of May 2, will also be shown for the first time. They will be tooled for roughing and finishing operations, respectively, on a large tractor shaft, and will show the possibilities both in removing a large amount of metal and in holding the work closely to size. A new 2½-in. turret lathe that is similar to the company's 2-in. machine but is for larger work will also be under power. A 15-in. turret lathe will be tooled for first operation work on forged steel gears and a 14-in. Fay automatic will be shown in second operation work on the same gear. Another 14-in. Fay automatic will be tooled for finning airplane cylinders.



Lathe Machines Pistons at High Rate without Operator

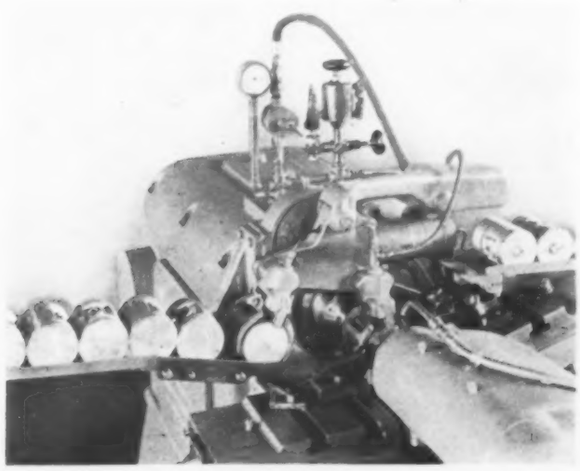
ROUGH turning, grooving and facing of aluminum automobile engine pistons at a high rate and without an operator will be demonstrated by the Seneca Falls Machine Co., Seneca Falls, N.Y., with its new model U Lo-Swing automatic lathe. This machine without the automatic devices was described briefly in THE IRON AGE of June 20.



All operations, including loading and unloading, are completely automatic, the machine when started continuing to perform until stopped. The piston is picked up from the runway by a "hand" and placed between an air-operated tail center and a dowel center that fits into the open end of the piston. The tool-holding slides then move into position, and the tools in the front slide or carriage perform the turning operation, while those in the rear slide groove, face and form. Upon completion of these operations the piston is removed and deposited by another "hand" on the runway on the opposite side of the machine, and is carried to the machine that performs the next operation. Simultaneously with the removal of one piston another is taken from the runway and placed in the machining position.

The loading and unloading mechanism, as well as the tailstock center, is pneumatically operated and controlled by adjustable cams that operate the air valves. The two sets of gripping fingers are designed to simuuate the action of the human hand. The time for removing and loading the pistons is approximately 3½ sec., and the tools withdraw and begin the next cut simultaneously with loading.

As outlined in the previous description, this lathe is self-contained, the entire drive, including motor, and the feeding mechanism being inclosed within the machine. All shafts are mounted on ball or roller bearings and careful attention has been given to lubrication and coolant supply. Floor space occupied is only 3½ x 6 ft., and the rigidity and weight of the machine, 5000 lb., is intended to permit use of tungsten carbide or other high-production alloys. Although developed for turning and machining pistons, the lathe is adapted for a wide range of cylindrical work up to 5 in. in diameter.



High-Speed Short-Bed Production Lathe

A NEW 12 x 18-in. production lathe, designed to use tungsten-carbide as well as high-speed steel tools, will be demonstrated by the Porter-Cable Machine Co., Syracuse, N. Y.

In general design, this machine, named the "Carbo-Lathe," is similar to the short bed lathe previously built by the company, but is heavier, has a Timken roller bearing spindle, ball-bearing shafts and a No. 3 Morse taper high-speed steel tailstock center. It is designed for high production turning and facing operations on pieces up to 7 in. in diameter. Spindle speeds depend upon the speed of the motor, the diameter of motor and drive-shaft pulleys and the speed change gears used, the range being 42 to 1500 r.p.m.

The machine is made up of but four major parts. The bed and headstock are in one piece, this casting being of chrome-nickel high-test iron. The tailstock, also in one piece, weighs approximately 100 lb., and it is clamped rigidly to the bed by two draw bolts. The ways are relieved in the center to provide two-point contact.

When furnished for motor drive, a 3 or 5 hp. motor is mounted on a hinged plate in the one-piece cabinet base, the mounting being such that the weight of the motor automatically takes up belt slack. Two-speed motors may be used on the machine. From the motor, the drive is by 3-in. belt to a ball-bearing disk clutch pulley on the drive-shaft; from the drive-shaft the power is transmitted to the spindle through helical and worm gearing, and to the carriage, through spur and worm gearing. Carriage pick-off gears provide five feeds, ranging from 0.005 to 0.030 in. A brake, controlled by the lever that operates the clutch, is provided for stopping the spindle.

Chips and lubricant fall through the center of the bed, and as there are no flat spots on the bed ways, piling up of chips under the carriage is eliminated. Zerk lubrication is provided, and the coolant system is arranged so that the flow is shut off automatically as the spindle stops. The machine occupies 34 x 48 in. floor space and is 48 in. high overall. The height to center of spindle is 42 in. A complete line of attachments can be furnished.

Grooves and Slits 300 Ball Yokes an Hour

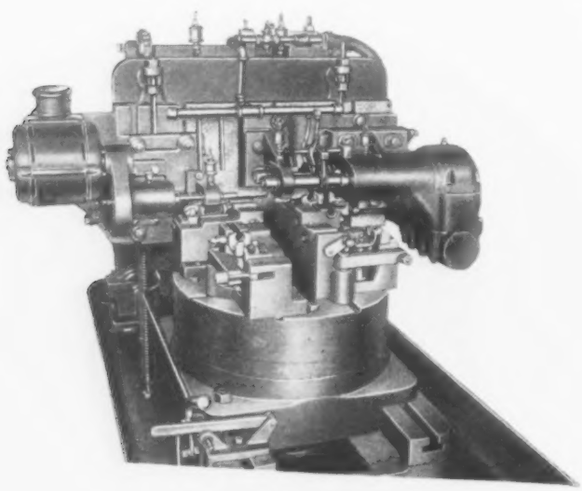
SLITTING and grooving of ball yokes for automobile universal joints at the rate of 300 pieces an hour will be demonstrated by the Producto Machine Co., Bridgeport, Conn., on its No. 50 Producto-Matic milling machine. The machine is arranged for motor drive and with vertical as well as horizontal travel of the cutter. The two operations, at right angles to each other, are done simultaneously.

The machine has a built-in four-station flat-turret type work-holding fixture, and when in operation two stations are in the milling position and two in the loading and unloading position. In the first milling position the slitting operation is performed by a double-spindle cutter block in tandem, having two saws on each cutter spindle. For the second operation the table indexes 90 deg. and the piece then grooved by means of an auxiliary cutter spindle mounted on the cross-slide of the machine and is driven by a separate 1 hp. motor. This miller is intended to eliminate the necessity of two machines and with it rehandling of the work, without any sacrifice in production. It is adapted for a wide range of pieces that require two milling operations at right angles to each other.

Cam Miller Adapted for Variety of Contour Work

A new motor-driven automatic cam milling machine, designated as the No. 12, will also be shown by the Producto company, in milling the contour of a cam used in an automobile four-wheel type expanding brake. Production is at the rate of 60 pieces an hour. Under usual conditions one man should operate three machines.

This is a single-spindle machine with the work-slide and the cutter-slide operating independently by means of two master cams. New features include flat box-type work and cutter slides, as well as the arrangement for bringing the work slide and the cutter slide together automatically at the beginning of the cut and allowing both slides to feed in opposite directions at the end of the cut so that the work may be removed easily. A new type of air cylinder for holding the work is used. The machine is adapted for milling radial airplane engines, timing cams, and other contour work that can be revolved in relation to the cutters.



New Large Turret Lathes

THE Warner & Swasey Co., Cleveland, will have in operation at the Cleveland Show a No. 5-A universal hollow hexagon turret lathe and a No. 5 universal all-geared head turret lathe. Both machines incorporate new features.

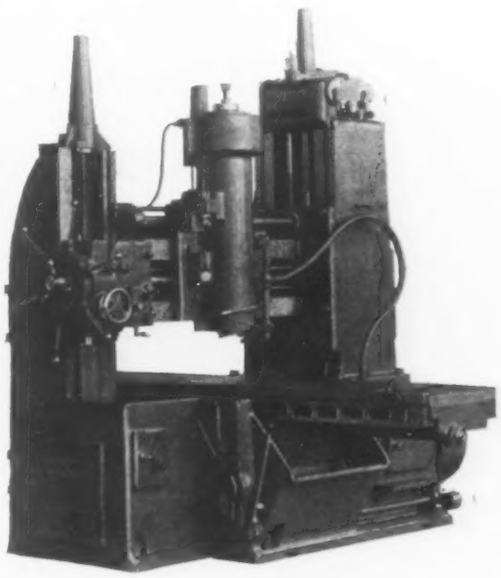
The No. 5-A lathe, the largest machine ever built by the company differs somewhat in construction from other Warner & Swasey heavy-duty "A" type turret lathes. The No. 5 universal is a ram-type machine of 2-in. bar capacity, and was designed to fill the gap between the No. 4 universal and the No. 1-A. A new hexagon turret saddle construction adds rigidity and tends to prolong the accurate life of this unit. The 5-A turret lathe will be demonstrated in machining flywheels, while the No. 5 machine will be in operation on shafts.

Bridge Type Vertical Milling Machine

THE Kearney & Trecker Corporation, Milwaukee, will have in operation a new bridge type vertical Mil-Waukee-Mil machining crankcases for Wright airplane engines. The machine is intended for face milling, die sinking, routing, profile milling and other operations on work having surfaces to be milled at various planes and levels. Saving in machining costs is claimed.

The company's 2200 series Simplex bed is used. The table is 22 in. wide and can be furnished for any length of feed from 3 to 11 ft. Housings are spaced to accommodate work up to 46 in. in width. The bridge or rail is arranged for power operation at the rate of 25 in. per min., and when adjusted can be rigidly locked in position. It has a total movement of 17 in.

The saddle that carries the vertical ram and spindle can be traversed a distance of 24 in. across the rail, by power feed or rapid traverse, and means are provided for making close hand adjustments of the saddle. The power feed for the saddle is through the standard feed box furnished with all Mil-Waukee-Mils and is the same at all settings as the table feed. Both the saddle cross feed and the table feed may be engaged at the same time for diagonal milling. Trip dogs stop the feed or rapid traverse at any point along the bridge.



Power down feed of 7 in. is provided for the spindle ram, in addition to means for both quick and slow hand movement. Four-position micrometer stops and indicator dial can be furnished for the ram. Spindle drive is through a standard Mil-Waukee-Mil speed box on the top of the main upright, and may be through pick-off gears or quick-change gear box. Hand crank adjustment of the table through stationary screw and revolving nut is provided. The bridge can be securely locked to both uprights and the saddle to the bridge and, as a further facility for accurate boring, a lock is provided for the table. The spindle is driven by a large herringbone gear and anti-friction bearings are used throughout this drive. Lubrication of the machine is automatic.

Large Rotary Miller for Production Operations

MANNING, Maxwell & Moore, Inc., New York, will have in operation a 72-in. Putnam rotary continuous milling machine, equipped for production milling in automobile and other plants having large numbers of duplicate parts to be machined.

Of the two Putnam unit milling heads employed, one, having two spindles, is used for roughing, and the other, a single-spindle head, for finishing. Both heads are adjustable along the rail by means of hand-operated screws, and means are provided for adjusting the position of the quill to compensate for wear of cutters. Each head is equipped with a constant-speed motor, speed changes being made through change gears. The rail and column is an integral casting that is unusually wide at the base, where it is attached to the bed casting. The rotary table has angular bearings and two flat bearings. It is driven by a worm wheel located inside of the outer flat bearing, the worm wheel being cut so that the pressure is always down on the bearings. The table feed is actuated by a separate motor and may be varied by means of change gears. Motor controls are so arranged that the failure of either spindle motor will automatically stop the table feed. Power loss from the motor to cuttter is minimized by locating the motor on the head and by the use of roller bearings and heat-treated helical gears in the drive.

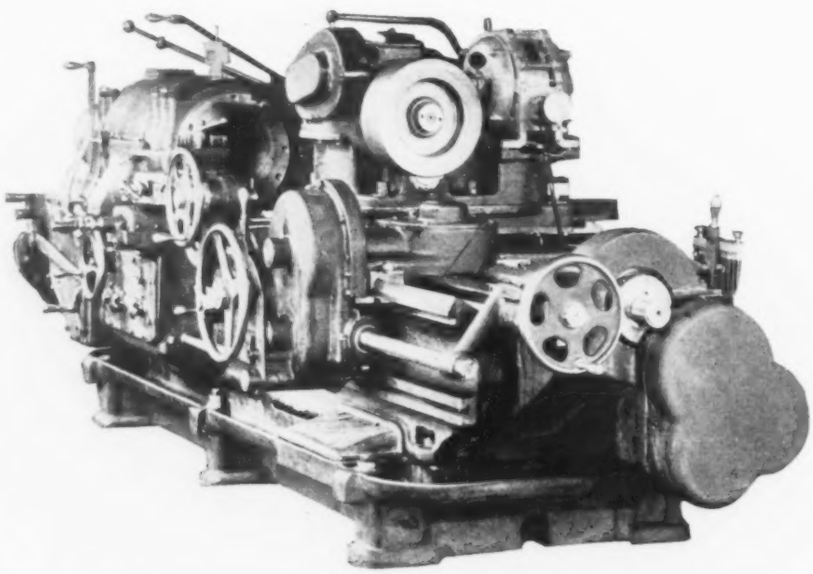
The unit milling head developed by the Putnam organization is also made with a multiplicity of speeds to meet the requirements of a more general service machine. It may also be furnished with a multiplicity of feeds, both for moving the quill in and out of the head and feeding the head along the rail, as well as with rapid traverse for both the quill movement and the heads.

Thread Miller for Oil Well Tools

THREADS are milled on oil well drilling tools, tool joints, drill pipe, etc., in a little more than one revolution of the work on the new thread milling machine that will be exhibited by the Lees-Bradner Co., Cleveland.

For work requiring faces and shoulders that are concentric with the threads provision is made so that these turning and facing operations may be performed at the one chucking. The machine is equipped with a selective-speed headstock, apron and cross-slide, square turret tool post and with selective power feeds. The hollow spindle takes bars or tubes up to 10½ in. in diameter, and the chucks, both front and rear, may be air or manually operated.

The cutter head unit is of rigid construction to prevent vibration and is provided with power rapid approach to and from the headstock to facilitate loading and unloading. The cutter spindle is worm-wheel driven and is carried in bronze bearings having take-up for wear. Headstock and cutter head units are individually motor driven, the drive being through pick-off gears that give a wide range of speeds. A taper attachment permits both straight and taper internal and external threads to be milled rapidly and accurately.

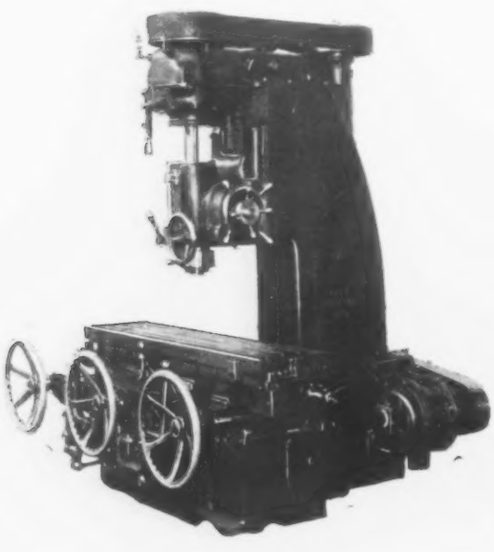


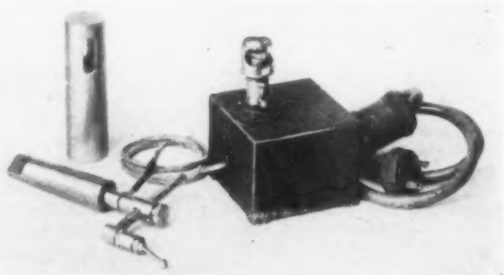
The company will also demonstrate a new heavy-duty worm and thread miller having a two-speed cutter head with reduction in the head and a quick change lever that permit making roughing and finishing cuts at one setting of the work. Another feature includes a quick-change cutter reverse mechanism between the drive shaft and cutter head, facilitating changing the direction of cutter rotation.

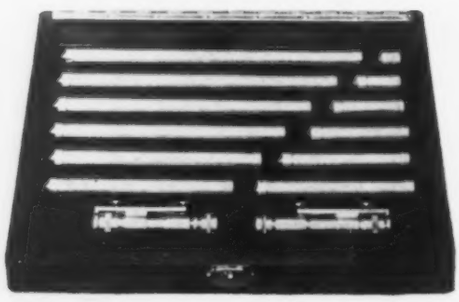
Vertical Milling Machine and Jig Borer

FOR milling die shoe bases and the recesses that take the die-block, boring out leader pin holes, and milling, drilling, reaming and boring holes in jigs and fixtures and similar work, the Reed-Prentice Corporation, Worcester, Mass., will offer a new model jig borer and vertical milling machine.

To procure accuracy in jigs and fixtures, work-brackets having V-blocks are provided for holding measuring bars and micrometer heads, shown in lower illustration, placed between the adjustable stops and the dial gages which are attached to the saddle and table. The two micrometer heads with 12 measuring bars provide







adjustments ranging from 1 to 12 in. by 0.0001 in. Holes are located accurately in either direction, cross or horizontal, with direct readings. Positioning of the table and work is controlled accurately by end measures, inside micrometers and dial indicators. A locking device is provided for fastening the table to the bed of the machine. An electrically-operated indicator, illustrated, facilitates setting the work accurately in line with spindle. This mechanism consists of an electric bulb operated from a light circuit with transformer connection.

The table working surface is 16 by 60 in. The machine has a longitudinal power feed of 48 in. and cross-power feed of 16 in. The vertical adjustment of the head on the column is 15 in. and the vertical feed of the spindle 9 in. The maximum distance from the end of the spindle to the table is 20 in. The depth of throat is 20 in., while the distance from center line of the table to the face of the column is 11¼ in.

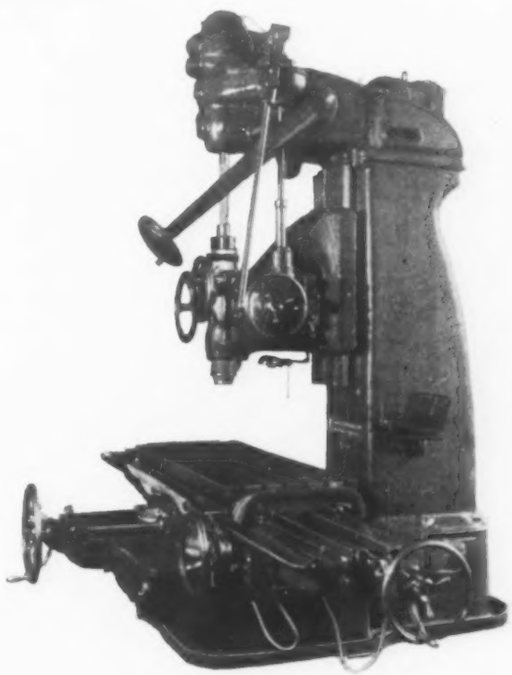
Eighteen spindle speeds, ranging from 17 to 600 r.p.m., are obtainable. Each speed has eight feeds, giving a range of feeds from 0.002 to 0.297 in. Longitudinal and cross-feed rapid power traverse in either direction is at the rate of 100 in. per min. Timken roller bearings are employed.

Adds Large Machine to Jig Borer Line

LARGE jig borers, designated as the Nos. 3 and 3A, will be among the new equipment shown by the Pratt & Whitney Co., Hartford.

The machine is similar to the company's smaller jig borers and embodies the same fundamental system of locating, using end measures, inside micrometers and dial indicators. It is also the same in locating to tenths, boring where it locates, and then checking to tenths without changing the work setup. Deviations from true accuracy are shown instantly on the dials.

The table is of increased size, and the open side construction gives a still greater size range. The machine is heavy, and means are provided for moving the table and work smoothly and quickly. A linear scale has been added so the larger dimensions can be rough set rapidly. Electrical improvements include lights over each dial indicator and above the work. The motor itself has four speeds, giving eight spindle speeds with the back gears. Shift from high speed to low is made in one movement of a single lever. A wide range of both hand and power feeds is provided, and the speed and feed combinations adapting the machine for rapid drilling, boring and reaming operations. Other features include force feed oiling throughout, Maag gearing and broad bearing surfaces.



Inserted-Blade Milling Cutters

GODDARD & Goddard Co., Detroit, will introduce a line of inserted-blade cutters that includes small facing cutters (shell end mills, etc.) from 3 to 7 in. in diameter; right and left-hand spiral facing cutters, from 8 to 20 in. in diameter; right and left-hand spiral straddle mills from 4 to 20 in. in diameter, and alternate-tooth cutters ranging from 4 to 8 in. in diameter, and from ½ to 1 in. in width.

Only 11 sizes of blades are required for the maintenance of the entire line so far developed. The blades have machined serrations on the backs which mate with corresponding serrations in the body tooth slot, which arrangement is intended to prevent tipping of the blade in service. It is also stated that the blade cannot slip radially because the serrations more than double the frictional contact area in the back of the tooth, this being further enhanced by the flat wedge used in front of the blade, the area of which is approximately the whole of that available on the tooth.

The serrations which run longitudinally are spaced on a 1/16 in. pitch, so that the blade, as peripheral chip clearance necessitates, may be projected radially in multiples of that unit. Blades may be moved out longitudinally as the face chip clearance decreases.

Develops 3-In. Spiral Bevel Gear Generator

NEW machines to be exhibited by the Gleason Works, Rochester, N. Y., include a 3-in. spiral bevel gear generator, a small straight bevel gear generator and a spiral cutter angle testing device.

The small spiral bevel gear machine has capacity for gears of 3⅜-in. pitch diameter, ½-in. face, 1¾-in. cone distance at 4 to 1 ratio, the largest pitch angle that can be cut for gears mounted at right angles being 75 deg., 58 min. and the smallest, 14 deg., 2 min. The fineness of pitch is limited only by the point width of the cutter.

This machine, which employs the generating principle of other Gleason bevel gear generators, is illustrated herewith, and will be described at greater length in a forthcoming issue. Cutters are of face-mill type with the blades integral with the head, and are made in four standard diameters, from ½ to 2 in. The smallest cutter has two blades, and the others have four. The cutters are made with alternate inside and outside cutting blades so that both sides of a tooth slot are cut simultaneously and the gears finished from the solid. The cutters are set up to the proper cutting position by a gage. An improved feature is a lever actuated quick throw-out mechanism which enables the cutter slide to be moved instantaneously to or from the cutting position for loading.

The straight bevel gear generator, to be described later, is a companion machine to that briefly described above. It differs from the spiral generator chiefly in that it employs two reciprocating tools instead of the circular type cutters.

Spiral Cutter Angle Testing Device

The new testing device, also illustrated, is used as a comparator to insure that the blades, in the circular cutters used on Gleason spiral bevel and hypoid gear-cutting machines, are mounted so as to have identical cutting pressure angles. The blades now being sold separately from the cutter heads, it is essential that they be carefully checked after being assembled in the head, because a slight variation in the angle of blades will cause flats to be cut on the teeth.

The device includes an indicator, a cutterhead carrier against which the cutter is held by spring pressure, and a dovetail slide on which the carrier is angularly adjustable. The motion of the slide on the base of the fixture is such that the blades in the cutter can be moved back and forth under the indicator finger. The cutter to be checked is placed on the carrier, which is then adjusted so that the indicator shows zero when the slide carries one of the blades to its full working depth. The next blade is then rotated into position under the indicator and moved back and forth.

If correct, the indicator will read zero for the full working depth of this blade; if not, the cutter is locked against rotation and the blade readjusted. A reading is thus taken on each blade and any adjustment necessary made so that all the blades will cut alike.

Both inside and outside blades can be checked, and the cutter-head carrier has a wide range of angular adjustment for covering the full range of pressure angles. The device is built in two sizes, one for 9-in. and the other for 12-in. cutters.

Cutter For Milling Large Castings or Forgings

HEAVY-DUTY face milling cutters taking facing cuts of ¼-in. deep and 9-in. wide at a feed of 30 a min., pulling 35 hp., will be demonstrated at the Cleveland Show by the O.K. Tool Co., Inc., Shelton, Conn. This tool incorporates the O.K. cutter blade of the tapered serration type, thicker than heretofore, and is designed for use in milling large castings or forgings where considerable finish or variation of cuts is encountered. The blade is of drop forged high-speed steel, inserted into a forged and heat treated chrome-nickel steel body.

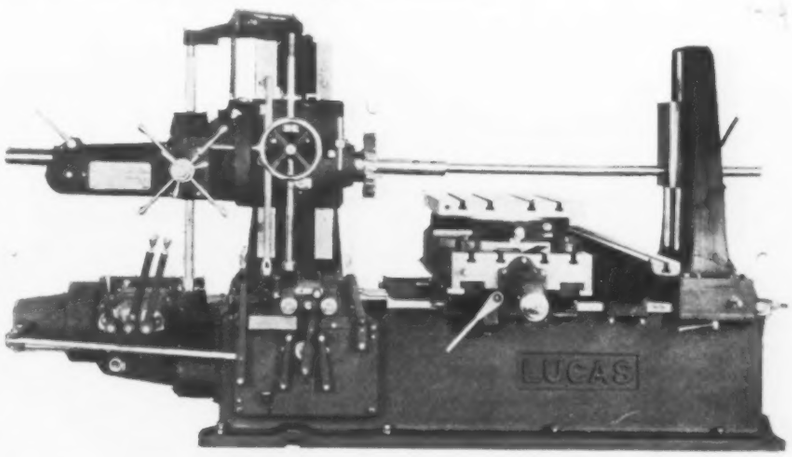
A new development in single point tool design with a holder that uses the O.K. cutter blade will be shown. This holder, available in plain, offset, straight, angular boring and other types, is said to be practically a solid tool, so far as overhang and rigidity are concerned, but retains the renewable cutting bit and is adjustable. A new offset side lock holder, developed to permit use of an O.K. tool holder for multiple tool operations in the turret tool post, may also be seen.

In addition to the above items, the company will exhibit its entire line of lathe, planer, shaper and boring mill tools, milling cutters, boring and facing heads and hollow mills, including multiple-operations tools.

New Model Horizontal Boring Machine

THE Lucas Machine Tool Co., Cleveland, will demonstrate its new model No. 41 "Precision" 3-in. spindle horizontal boring, drilling and milling machine.

Compared with its predecessor, the No. 31, this machine is heavier, more rigid and more powerful. Its bed is wider and has leveling screws in the lower flange to facilitate accurate setting up. The saddle has been made longer and has automatically equalized clamps that are operated simultaneously by a ratchet wrench at the front of the machine. More efficient means of clamping the spindle head has also been provided, and cramping of the platen is minimized by a long narrow guide with taper gib.



The speed range of the machine has been widened and the number of changes increased 50 per cent, providing smaller increments of speed. Automatic lubrication is by means of a pump in the driving gear box and oil rings on the spindle. Controls are located more conveniently, and safety features, such as additional limit trips, have been added.

Larger machines in the "40" series, namely the No. 42, having a 4-in. spindle, which will also be exhibited, and the No. 43 with 5-in. spindle, have the features noted above, and, in addition, are arranged so that cross adjustments of the table may be made from both the left and right-hand sides of the front of the saddle.

A new self-contained square swiveling table, designed to provide greater clamping surface and to support the work better on its edges, has been developed for these machines. It is mounted on a baseplate and may be used interchangeably on different machines. Graduations are in half degrees, and a lock bolt for four positions, 90 deg. apart, is provided. Swiveling is facilitated by an elevating ball thrust bearing that lifts the table slightly off the baseplate during the swiveling operation.

Gear Burnisher with Extended Range

A NEW gear burnisher with standard range extended to handle gears up to 12 in. in diameter, but which may be arranged to take even larger gears, will be shown by the Cincinnati Shaper Co., Cincinnati.

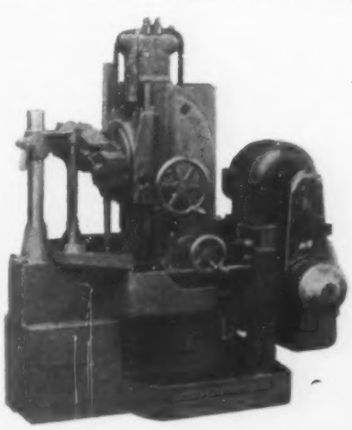
The method of counterweighting is a feature. The pressure with which the burnishing gears engage the "green" gear is fixed by means of these counterweights which permit sufficient movement of the carriage slide to compensate for any small variation in the pitch diameter of a run of gears.

Operation is entirely automatic. After placing the "green" gear between the master gears, the operator pushes a lever to bring the "green" and master gears into engagement, and then throws the starting switch. The spindle makes a predetermined number of revolutions in one direction, the same number in the reverse direction and then stops automatically. The burnishing time can be varied from 5 to 6 sec. up to 30 sec. or more.

Small Manufacturing Type Gear Hobber

IN addition to a new 36-in. manufacturing shaper, and a new 48-HS and 48-HL manufacturing gear hobber, Gould & Eberhardt, Newark, N. J., will show a new small hobbing machine designated as the 9-H manufacturing type. It is designed for generating fine pitch and small diameter spur, helical, herringbone and worm gears, producing gears up to 9 in. in diameter with the arbor support in place, and gears up to 12 in. in diameter with the support removed, and is rated for 10 D.P. in steel. The weight of the machine is approximately 2800 lb.

The cutter slide is adjustable for depth and diameter of gears to be cut, and may be swiveled 180 deg. for either right or left-hand helical gears of any angle. The cutter arbor is portable to permit using arbors of different diameters and to accommo-



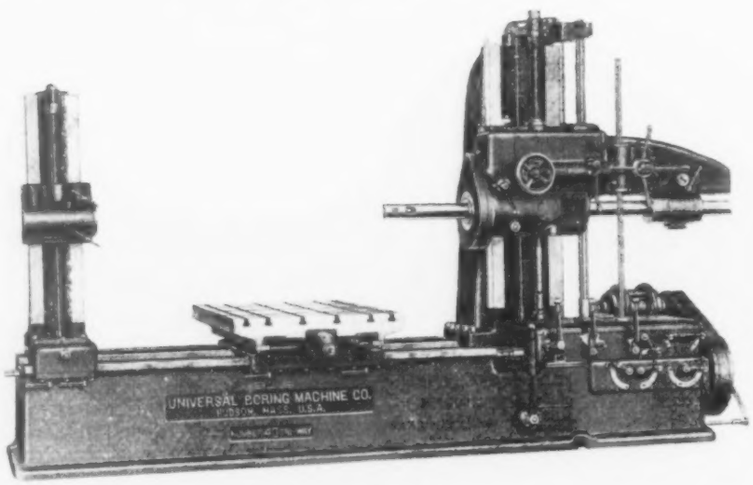
date small diameter solid-shank hobs. The work table is fixedly located and mounted on anti-friction bearings directly in the base casting. The hardened and ground indexing worm engages with a chilled cast iron wheel. The work arbor is of single post type with an adjustable arm that can be locked in any position. Lubrication is by both pressure and gravity systems.

The new 48-HS and 48-HL manufacturing type gear hobbers, also to be shown, are rated for 2 D.P. in steel and have capacity up to 32 in. diameter with the arbor support, and 57 in. diameter without the arbor support.

Improved Horizontal Boring Machine

THE Universal Boring Machine Co., Hudson, Mass., will exhibit an improved No. 40 Tri-Way, universal (horizontal) boring machine. The Tri-Way bed has been retained, but gear boxes have been redesigned, and now incorporate ball bearings throughout the speed-box mechanism, as well as multiple splined-shafts. The head assembly is also a new design, having ball bearings throughout the drive mechanism, the spindle itself being mounted on Timken roller bearings. A six-splined ball-bearing vertical drive shaft transfers the power from the gear box to the head. Motor drive, but without motor, is standard equipment.

Specifications are as follows: Main Boring bar, 4 in. diameter, No. 6 Morse taper; distance between faceplate and outer support, 96 in.; vertical travel of head on column, 40 in.; and maximum distance from top of table to center of bar, 42½ in.

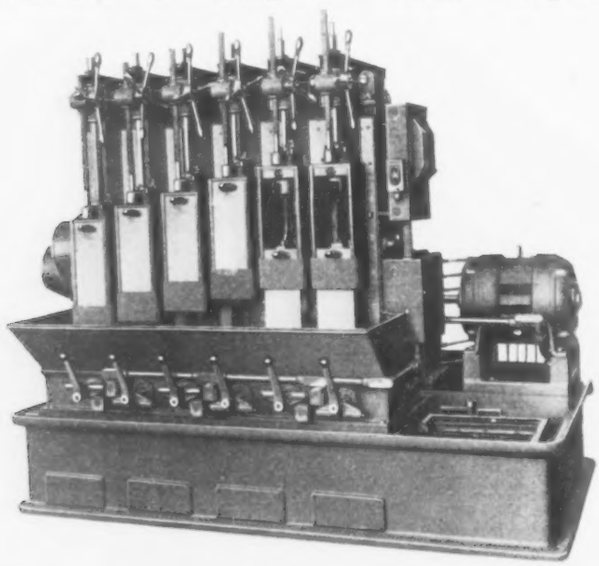


The table is 40 x 63 in., and has 48 in. power cross feed. The spindle speed range is 8 to 300 r.p.m., the milling feed range is 0.53 to 11 in. per min., and the boring feed range from 0.13 to 2.7 in. per min. The approximate shipping weight is 28,000 lb.

Multiple-Spindle Vertical Deep-Hole Driller

THE Pratt & Whitney Co., Hartford, Conn., will exhibit, among other new machines, a six-spindle vertical deep-hole driller using the rifle-barrel method of drilling. Accuracy and rapid production are features, and being of vertical design, floor space is saved. The machine has been employed to advantage in the automotive industry in drilling deep holes the length of a connecting rod to the wristpin, and is adaptable also for drilling the tell-tale holes in staybolts for locomotive boilers and for other deep-hole jobs.

The heavy cast iron bed, containing an oil reservoir, has a rigid column mounted on it. This column carries the six work spindles and slides and their individual driving mechanisms. The six drills, which remain stationary, are mounted vertically on the bed beneath the spindles. At rear of the bed are six high-pressure oil pumps, one for each drill, and all driven from one 15-hp. separate motor.



Slides carrying the work fixtures are counterweighted and are scraped to ways on the front of column. Their spindles rotate the work in the fixtures at proper speed for drilling. The six slides thus feed down independently under power and carry the rotating work to the stationary drills. Each spindle may be operated without relation to the others. Each spindle unit has six ball bearings, two on the upper part of the spindle, two on the upper work-holding fixture attached to the spindle and two in the lower work-holding fixture.

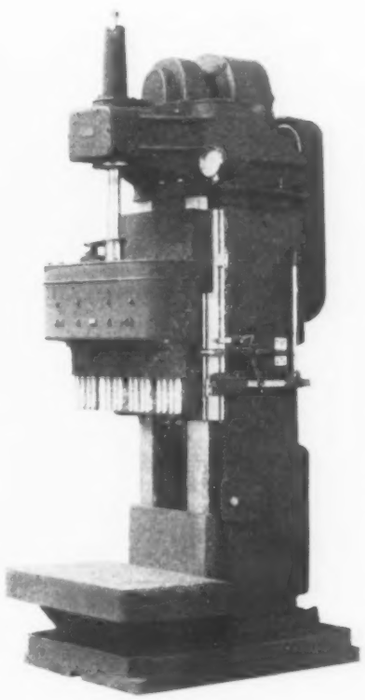
Each drill consists of a hollow shank to which is brazed a short high-speed steel drill tip. Oil is forced to the drill tip under 500-lb. pressure, inside the shank, and returns outside through a groove in the shank. This method of handling is economical of drills, as oiling keeps them cool; the shank is inexpensive and sustains all twisting damage in case the drill meets a hard spot or becomes jammed. The expensive tip can be re-brazed to a new shank and reground as necessary until it is used up.

New Multiple-Spindle Drills Equipped Either with Mechanical or Hydraulic Feeds

TWO new vertical multiple-spindle drilling machines, both designated as the No. 16, one with mechanical feed and the other with hydraulic feed, have been developed by the Foote-Burt Co., Cleveland, for work that is too heavy for its former machines.

The No. 16 drill with mechanical feed has 16-in. ways, while the No. 16 hydraulic machine has 20-in. ways, as well as a wider column, to accommodate the cylinder. While adapted for a wide range of application, each machine is built around the particular job on which it is to be used. The base, upright and drive bracket are standard units, but the table, head, drive and feed and speed arrangements are varied to suit requirements.

Although designed to slide on the ways of the upright, the standard table is usually held in one position by spacer blocks between it and the base. All spindles have ball thrust bearings, and can be equipped with adjustable collets so that vertical adjustment can be made on individual spindles. The head is lubricated by force feed system, the oil being carried in the head and circulated by a pump on the head. The motor drive includes a device that protects both the motor and the machine in case the latter should be stalled. The motor is geared to the horizontal shaft in the upper housing, from which the drive is through a pair of spiral bevel gears to the head drive shaft.



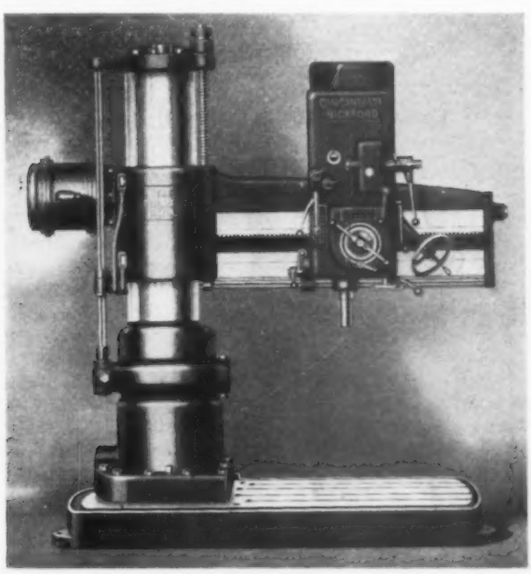
Feed for the No. 16 mechanical is taken from the main horizontal shaft through a pair of small pulleys to a worm and worm gear set, then carried through the vertical feed shaft to a large worm and worm gear set mounted on the feed pinion shaft. The pinion is in mesh with a steel rack on the slide. The standard length of travel is 16 in. Hand fast travel in either direction is provided.

Hydraulic feed mechanism includes an Oilgear pump and a 5 1/8-in. cylinder with 16-in. stroke. The following feeds are available: Fast traverse forward at 175 in. per min.; No. 1 and No. 2 slow feeds forward at 1 to 13-in. per min., each; Neutral; No. 1 and No. 2 slow feed return at 1 to 13 in. per min. each; and fast traverse return at 250 in. per min. Feed is engaged by hand lever on the side of the machine, and feeds are automatically controlled throughout the cycle by dogs on the head slide. Delayed reverse action can be obtained if desired.

Radial Drill Features Centralized Control

COMPLETELY centralized control is a feature of a new 11-in. column Super-Service radial drill to be shown by the Cincinnati Bickford Tool Co., Oakley, Cincinnati. The machine is built with 3 and 4-ft. arms and with 24 speeds, ranging from 29 to 1850 r.p.m., in the head.

All speed and feed changes are made in the head through selective sliding gears, tumbler gears, loose keys, and dive key mechanisms having been eliminated. Column clamping is also controlled from the head, and the arm is raised or lowered and clamped or unclamped by means of levers near the spindle. An interlocking arrangement prevents raising or lowering the arm while it is clamped, but when unclamped the arm may be elevated or lowered easily through multiple disk clutches which run in oil.



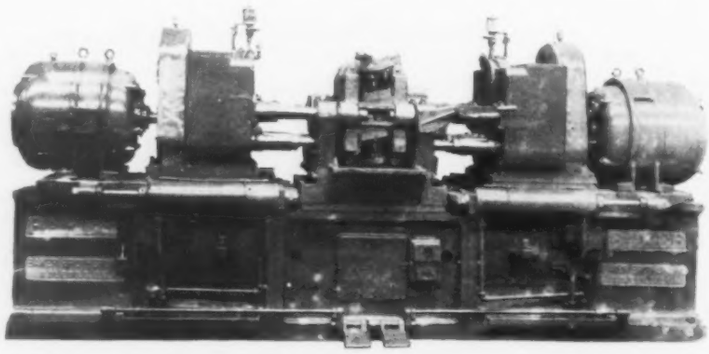
To most effectively resist combined bending and torsional stresses due to feed pressure, the arm is of full box section and has no openings in the front or rear wall, such as were formerly regarded as a foundry necessity. All rotating parts such as arm shaft and clutches are entirely inclosed. Lubrication has been designed so that the machine operates over a long period without oiling. Clutches run in oil and gears and bearings are flooded with filtered oil. The entire drive from motor to spindle nose is mounted on ball or roller bearings.

A rapid hand traverse for the head has been developed. The head is supported by an adjustable roller bearing gib, or a hardened steel arm-way, this being a patented feature which permits the head to be moved rapidly and easily. All shafts are ground and multiple splined with integral keys. Only one motor, of constant-speed type, is required for the machine.

Hydraulic Feed Machine Drills Steering Knuckles

DRILLING of two steering knuckles simultaneously will be demonstrated by Baker Brothers, Inc., Toledo, Ohio, on a horizontal machine having separate hydraulic feed for each head and individual motor drive for each spindle.

The base, built on the unit plan, is in three sections, the middle one of which may be made in various lengths to accommodate fixtures for various sizes of work to be drilled or bored. Each of the base end sections carries a head that is fed toward the work by separate Oilgear pumps and cylinders, the traverse engagement of each head being controlled by foot pedals. The feed has the characteristic rapid advance and return of the Oilgear device, and also infinite number of adjustments of feed rate. Use of separate hydraulic pumps for each end of the machine simplifies the piping and eliminates use of an equalizing mechanism. The spindle drive motors may be mounted on the saddles, as shown, or on the heads.

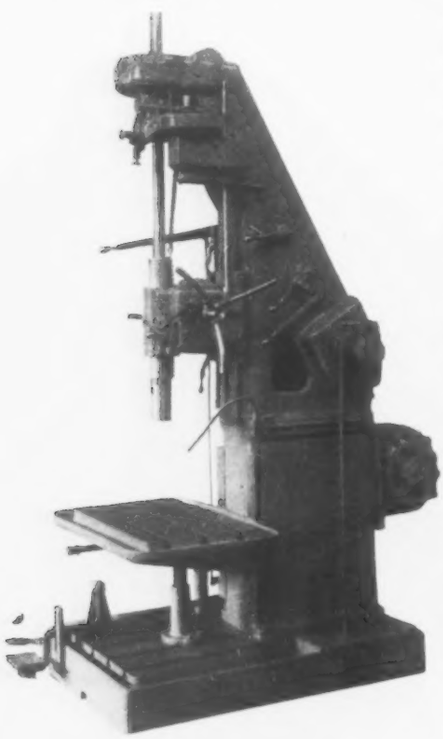


This machine, designated as the No. 25 H. H., may also be equipped with one spindle for each head for work requiring boring, counterboring and other operations.

Modernized Drilling and Tapping Machine

ANTI - FRICTION bearings are used throughout the sliding-head all-geared drilling and tapping machine illustrated, which will be introduced by the Barnes Drill Co., Rockford, Ill.

This machine, designated as the No. 262, handles high-speed twist drills up to 2½ in. and will bore an 8-in. hole in cast iron. It is suitable for cylinder boring, deep hole work and tool room service. There are eight quick-change geared speeds, with lever controls extended to the front of the machine, and eight quick-change geared feeds. Speeds and feeds are clearly indicated for each setting of the control levers.



The spindle is 2 in. in diameter, is of six-spline construction and is provided with roller thrust bearing. The spindle sleeve is fitted with the company's patented dovetail rack, and use of a split bearing for the spindle sleeve, with take-up for wear, is a new feature. The cap is of Gunite material and has laminated shims. The spindle travel at any setting of the head is 15½ in., but other lengths of travel can be furnished. The regular travel of the sliding head is 19½ in. Levers for raising and lowering and clamping the head are conveniently located.

Either silent chain motor drive, or single pulley drive can be furnished. Spiral crown gears of heat-treated steel are used, and may be furnished in three different ratios. Transmission bearings are of Timken tapered roller type, and spindle thrust is taken by a roller bearing having a double set of rollers. All bearings are lubricated automatically. The distance from the face of the square column to the center of the table is 13 1/16 in. The net weight of the machine with 5-hp. motor is 3500 lb.

Heavy-Duty Turret Lathes

FEATURES that adapt the Libby type H heavy-duty turret lathe for machining modern alloy steels and for the use of high-speed cutting tools, including tungsten carbide, will be pointed out by the International Machine Tool Co., Indianapolis, at the Cleveland Show.

This machine is equipped with alloy steel heat-treated Maag gears of wide face and coarse pitch. Ball and roller bearings are used on the spindle, shafts and studs and on all machines up to and including the 10¼-in. bore, the spindle is mounted on roller bearings, two sets on each end opposed. Each machine has 77 sets of ball and roller bearings. With the present gear box changes in feed are made by lifting a lever and shifting a cone of gears. This enables the operator not only to change feeds quickly, but also to cut threads of different pitches without having to change gears. The rapid traverse mechanism has been improved by increasing the number and size of the disks and clutches, and the mechanism is now inclosed and runs in oil. The turret and tool post aprons are also inclosed, and the parts run in oil. The ways of the machine are hardened steel strips dovetailed and driven in from the end of the bed way and ground. Lubrication of the machines is entirely automatic.

New Hydraulic-Feed Multiple-Spindle Drill

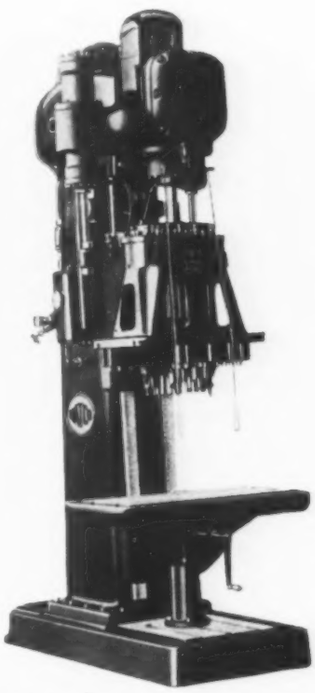
THE National Automatic Tool Co., Richmond, Ind., will show a new medium sized adjustable multiple-spindle hydraulic feed driller designed for a wide variety of work.

Base, column and other members are of rigid and heavy design, and ease of control is a feature. The hydraulic feed mechanism includes two 5-in. low-pressure oil cylinders mounted in the heavy brackets at the top of the column. The pressure in these cylinders is supplied by a constant-speed pump located on top of the column and driven from a gear on the main drive shaft; the maximum combined pressure is 8000 lb., and is applied directly to the lugs cast on the head slide. A by-pass in the pump returns excess oil to the reservoir when a predetermined pressure is reached. This arrangement protects the drills should an unusually hard spot be encountered. The feed ranges from 0 to 15 in. per min., and rapid traverse is at the rate of 90 in. per min.

Control of the feed is by means of two pendant handles, one of which is used to start the operating cycle, consisting of rapid approach to the work, feed, rapid return and stopping of the head at the starting position, all of which are controlled automatically by adjustable trip dogs. The other control handle is used to stop the head in an emergency; it causes the head to stop and return automatically to the starting position.

Three sizes of heads have been designed for the machine, a 12 x 18-in. rectangular head bored for 24 spindles, a 16 x 24-in. head with either 22 or 12 spindles, and an 18-in. diameter head bored for 12 spindles. These heads may be arranged for independent change of speed for each spindle or for a single speed for all spindles; both types have a neutral position for spindles not in use. All gears are hardened and run in oil. Drill spindles range from 1⅜ to 2⅛ in. in diameter and have vertical adjustment of 2 in.

The machine is powered with a 10-hp. 1200-r.p.m. direct-connected motor, which drives the head through heat-treated alloy-steel change gears and a set of heat-treated bevel gears. Spindle speeds range from 331 to 1940 r.p.m. on the 12 x 18 in. head and from 185 to 1019 r.p.m. on the 18-in. round and the 16 x 24 in. 12-spindle head. The machine will drive eight ⅝-in. or 24 ¼-in. drills in cast iron or six ½-in. and 14 ¼-in. drills in steel at maximum feeds of 0.004 and 0.003 in., respectively.

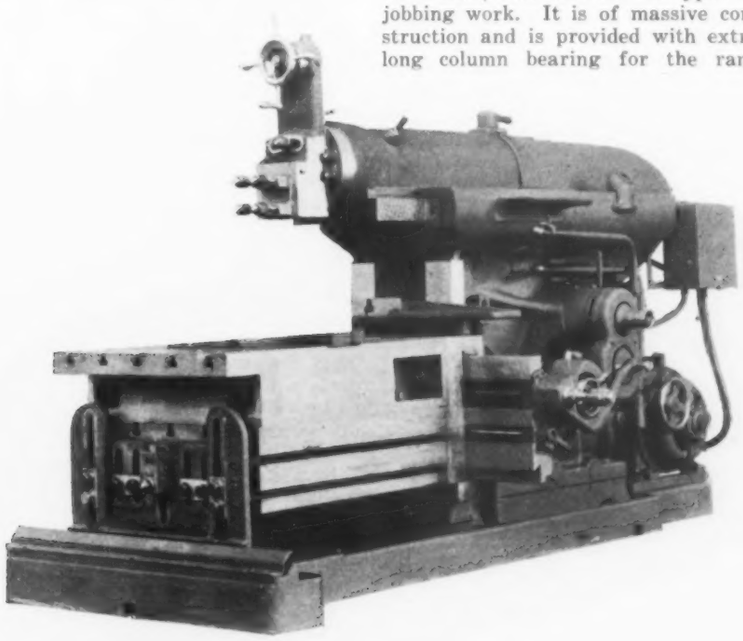


Floor space occupied by the machine is 34 x 85 in. and the net weight is 11,500 lb.

Shaper with Table for Unusually Large Pieces

FEATURING the exhibit of the Ohio Machine Tool Co., Kenton, Ohio, will be a new 36-in. "Super-Dreadnaught" crank shaper having a 48⅞-in. x 30-in. table that accommodates unusually large work and large irregular pieces that otherwise would have to be machined on a planer.

The machine is intended for use on die blocks, fixtures and all types of jobbing work. It is of massive construction and is provided with extra long column bearing for the ram, which is of double-wall box section type and is designed so that even with fully extended stroke there is 56 in. of contact between the column and the ram. The ram gibbing takes care of both lateral and vertical thrust. The large head on the ram has 13 in. diameter swivel and a 5-in. micrometer with handwheel control. The machine is equipped with a substantial table support and a jack which equalizes the weight between the table support and rail, so that alinement is preserved and the rail protected from undue wear. The bull gear and steel pinion are of herringbone type. The bull gear is of semi-steel and is in one piece. The crank arm is of steel.



All control levers are within a radius of 12 in. Automatic force feed lubrication, quick-change gears and instantaneous feed are regular features, and power rapid traverse and power elevating attachments can be furnished. A box table having top surface of 36 x 20 in., including saddle, is also made, and also a drop table that increases the maximum distance between the table and ram to 30½ in. A filler block can be utilized to fill in the drop table when the surface of a regular table is required.

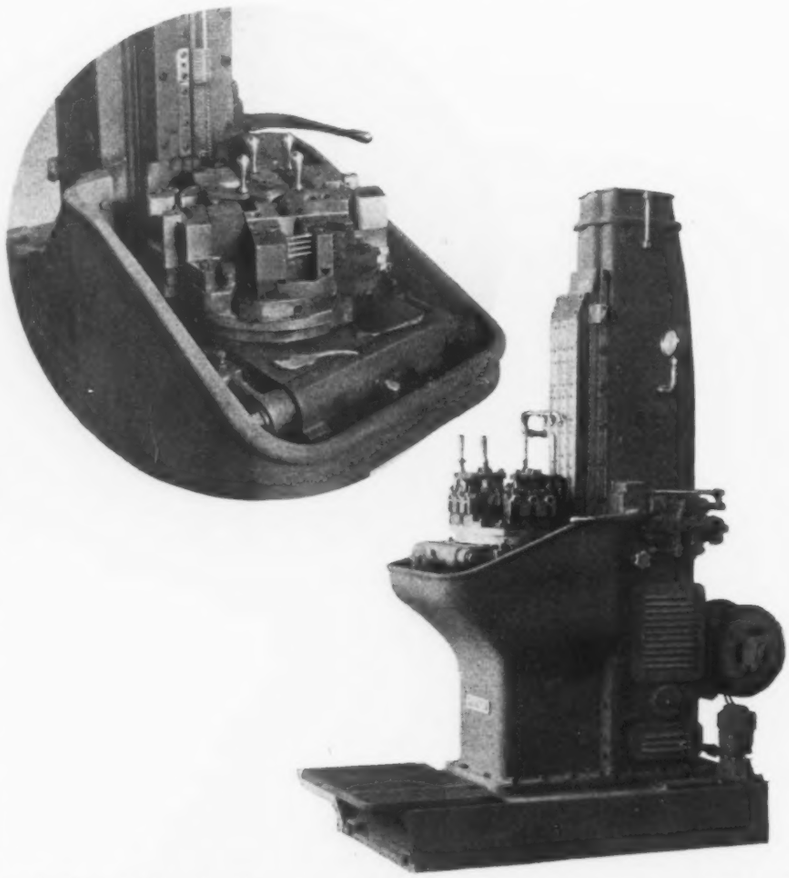
Surface Broaching Machine Roughs and Finishes in One Operation

PIECES having one of more flat or irregular surfaces may be rough and finish machined in one pass of the tool on the improved No. 1 surface broaching machine illustrated, which will be shown by the Foote-Burt Co., Cleveland. In addition to high production, minimum tool maintenance expense is emphasized.

Fixtures and broaches are designed special for each job. Four-station automatic indexing tables are usually employed, and production is set at the speed at which the operator can load and unload the work. Tiering of work, where possible, and use of one-movement clamping levers enable the operator to handle a large number of pieces.

Reciprocating movement of the broach is accomplished by means of a motor-driven hydraulic pump. Slow cutting speeds, averaging 10 to 40 ft. per min., and solid support of the broach minimize tool maintenance expense, the tool being used continuously for several days, in most cases, without regrinding. The broach has a large number of teeth and the depth of cut is evenly distributed, so that individual teeth are not burdened and dulled. The lower teeth are roughers and remove the major portion of the metal; the upper teeth do the final finishing and are never used for roughing. This arrangement makes for close accuracy, as well as for long tool life. The broach may be removed conveniently for sharpening; in sharpening, only the edges are touched up.

The broach holder is securely fastened to the broach slide, which, in turn, is bolted to the lower end of the hydraulic plunger or piston rod. The hydraulic pump develops a pressure of 1000 lb. per sq. in. Direction of oil flow in the cylinder is controlled by a three-way valve operated by dogs on the slide. The speed of the down, or cutting, stroke is set to suit the work by adjusting a screw on the pump. The up or return stroke is at fast rate. The slide may be stopped or started at any point of the stroke by means of a convenient lever, or may be reversed by turning a small handwheel.



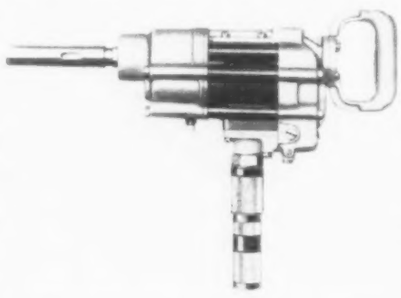
Pump, cylinder and piping are inclosed in the column, but are accessible through a door in the side. The oil reservoir is open to the atmosphere at the highest point above the cylinder, thereby eliminating possibility of air accumulation. The base of the machine forms the coolant tank. A 7½-hp. 1800-r.p.m. motor is usually recommended for the machine.

Soft steel forged 6 and 8-in. plier jaws, such as illustrated, are broached at the rate of 1200 per hour. The broach speed is 26 ft. per min. and about ⅛ in. of stock is removed. The finish is smooth and the serrations sharp.

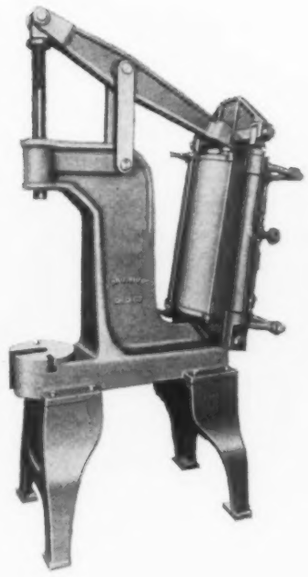
Air Tools For Production Drilling

THE Rotor Air Tool Co., Cleveland, has put on the market type E-4-C and E-40-C drills for production drilling, reaming, stud-setting and nut-setting. The E-40-C differs from the E-4-C in having a longer cylinder and hence giving more power. Speeds ranging from 200 to 600 r.p.m. are provided, covering drilling from 1 to ½ in., reaming from 11/16 to ⅝ in. and tapping from ¾ to ⅝ in. The E-4-C weighs 16 lb. and the E-40-C 17 lb.

These drills have compound gears made of heat-treated nickel steel and extra heavy ball bearings. The quick-acting governor prevents racing of the motor while running free, giving the spindle a uniform speed, prevents excessive wear and reduces air consumption. The standard Rotor motor, with only three moving parts, is used. The drills are furnished with side handle and with the usual optional equipment of breast-plate, spade-handle, eye-bolt, etc.



In addition, the company will show its new Rotor type D-0 grinder for 4 x 1-in. grinding wheels, handy for light grinding on a bench or in close quarters; its E-0 drill for high-speed production work; and its E-1-C and E-2-C drills for heavy-duty drilling, reaming and nut-setting.



Hydro-Pneumatic Broaching Press

TWO types of machine exhibited by the Hannifin Mfg. Co., 621 South Kolmar Avenue, Chicago, include a hydro-pneumatic broaching press and an air-operated rivet press. The latter will be described separately later.

Broaching operations in an air-operated press are made in this new machine by means of an application of hydraulic speed control. This avoids plunging the broach smartly into the hole, with resultant breakage. The control consists of two small cylinders, one on each side of the air-operated power cylinder.

Piston rods of the hydraulic cylinders are connected through a cast steel cross-arm to the piston of the air cylinder. Speed control is accomplished by the regulated transfer of oil from top to bottom of the oil control cylinders. During the power stroke the oil passes through a needle valve, which can be regulated to any desired speed. During the return or idle stroke the oil passes through a swing check, permitting the ram to return to top position at full speed.

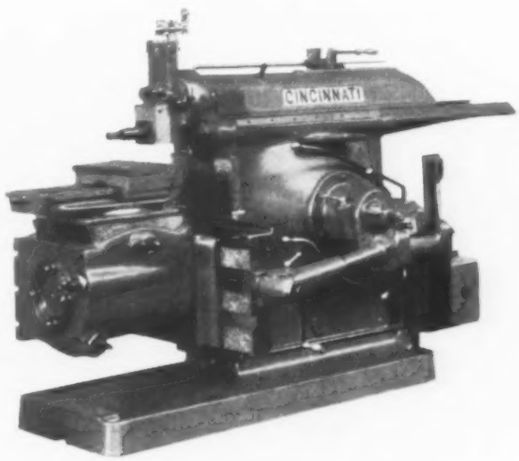
This oil-cylinder speed control results in smooth, uniform travel of the ram at any pre-determined speed without, it is said, any loss of power. The machine is not designed for broaching operations requiring broaches longer than 1 ft., but on work within its range, production is rapid.

On hydraulic shock absorbers, the hole, which must be straight, smooth, and held to close limits, output ranging from 625 to 850 an hour is claimed. The broaches used are about 6 in. long and are said to be producing 20,000 broached holes each.

Heavy-Duty Shapers with Increased Cutting Speeds

TWO new heavy-duty shapers, one 16-in. and one 24-in., with built-in power rapid traverse to the table, will be exhibited by the Cincinnati Shaper Co., Cincinnati. Cutting speeds have been increased, giving these machines the highest number of strokes of any shaper built by the company. A feature is the construction of the ram bearings: these now extend to the end of the ram and reduce overhang from the cutting tool to the ram bearing by 2 5/8 in.

The 16-in. machine will be equipped with the company's universal table, which is a revolving table with a tilting top, without hinges, jacks or table support. A new combination tool tray and cross-rail guard will be shown. Timken thrust bearings used on each end of the cross-feed screw in place of the usual bearings, are said to make the table as light as a feather to hand feed. The 24-in.



shaper, incorporating the features noted above, will be equipped with a full box table, and demonstrated in heavy, accurate cutting.

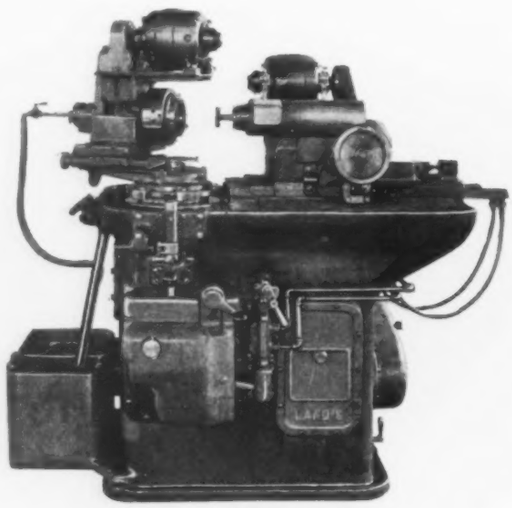
General-Purpose Marking Machines

MARKING equipment to be exhibited by the Noble & Westbrook Mfg. Co., Hartford, Conn., will include a new model No. 15 general-purpose power-operated machine, which, with suitable dies and work holders, may be used for marking a variety of round, flat, and uneven surfaces. A new No. 4 hand-operated marking machine and a No. 19 power-operated rapid production unit for marking drills and other parts of short rod construction, will also be shown.

Another new model included in the company's exhibit is the No. 41 graduating machine for graduating micrometer collars. Accuracy is secured by specially designed gears. By turning the handle a couple of revolutions, the operator can graduate the piece and mark the numbers. Specially engraved marking dies are used for rolling the graduations and figures.

5-In. Semi-Automatic Hydraulic Ball Race Grinder

INTERNAL or external raceways or face raceways for end thrust bearings may be ground on a high production basis, on the new 5-in. self-contained semi-automatic grinder to be shown by the Landis Tool Co., Waynesboro, Pa. The machine is also adapted for other forms of radial grinding.



Hydraulic power is used for oscillating the work-head, feeding the wheel-head, and traversing the wheel-head slide. The operator merely loads the work and throws the main control lever. Work rotation, work-head oscillation and wheel carriage traversal start simultaneously. About the end of the wheel carriage movement, the wheel-head feeds in rapidly, slowing down as the wheel nears the work, and as the wheel comes in contact with the work the grinding feed is engaged. From that point on the grinding feed controls the speed of the feeding-in movement which ceases when the feed comes against a positive stop indicating that the work has been ground to size.

Throwing the main control lever in the opposite direction reverses all the movements, causing the wheel and work heads to return to their starting positions, at which point work rotation and work-head oscillation automatically stop with the head in its back position. This facilitates changing the work. One operator can run two machines.

Three specially balanced electric motors are employed. The grinding wheel spindle is mounted in adjustable steel back babbitt bearings and runs at 7750 r.p.m. The hydraulic feed movement is easily regulated, and to compensate for wear, the wheel may be fed by hand. The wheel-head slide hydraulic piston is so connected with the wheel-head piston that the movements cannot get out of time, and a hydraulic cushioning device causes both movements to come to a stop slowly, thus eliminating shock.

The grinding wheel truing fixture is attached to the front of the wheel-head only when in use. It is adjustable for different radii and is fed to the grinding wheel by means of screw with graduated dial. The vertical oscillating spindle is mounted on heavy pre-loaded ball bearings, and oscillated by a double-blade type oil motor. Adjustable reversing dogs on a ring at the top of the spindle regulate the length of arc of oscillation. The work-head may be adjusted toward the center of oscillation or at right angles to it. Work-holding fixtures may be of various designs, but the cam-operated three-finger spring-loaded type is typical.

A new 6-in. type C plain hydraulic production grinder, to be described in a later issue, will also be demonstrated by the company.

Special Grinder for 3/32 to ½-In. Drills

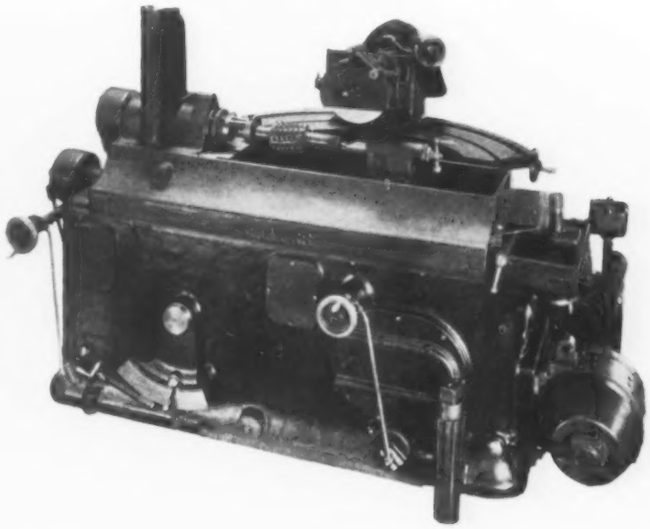
FOUR new machines, including a special type grinder for drills from 3/32 to ½-in., will be introduced by the Oliver Instrument Co., Adrian, Mich. The other machines, namely a face mill grinder for face mills up to 26 in. in diameter, a tap grinder, and a heavy-duty die making machine, with capacity for both filing and sawing work up to 3 in. thick, will be illustrated in a later issue.

The drill grinder is designed not only for producing the Oliver type point, but also points adapted for countersinking, counterboring, chamfering, etc. Thick web oil hole drills and chamfering or nut drills can also be ground, the latter type being ground on the point and shoulder. In addition to grinding the cutting edge, the heel is backed off to give more clearance to the chips, which results in smoother holes. The point angle may be varied from 60 to 180 deg.

The drill is located in a jig or fixture which drops into position in a holding mechanism on the machine. In the bench type illustrated, the ¼-hp. driving motor is inclosed in the base and drives the spindle through a flat canvas belt, an idler providing the driving tension. The spindle is mounted on ball bearings in a swinging frame, and is adjusted horizontally by means of a knurled knob, this horizontal adjustment being for the purpose of obtaining the amount of center clearance or undercut desired so that any type of point may be ground. It also provides for grinding shoulder drills, the point being ground in the usual way and reset for the shoulder. The wheel is then moved sidewise sufficiently to come in contact with the shoulder, which is ground in the same manner as the point.

Automatic Hob and Cutter Grinder Has Wide Range

STRAIGHT and spiral hobs, milling cutters, reamers, taps and other tools are ground automatically on the new hob and cutter grinder to be exhibited by William Sellers & Co., Philadelphia. The machine will grind work up to 12 in. in diameter and 12 in. long; in addition to wide range, ease of set-up, extreme accuracy and rapid operation are features.



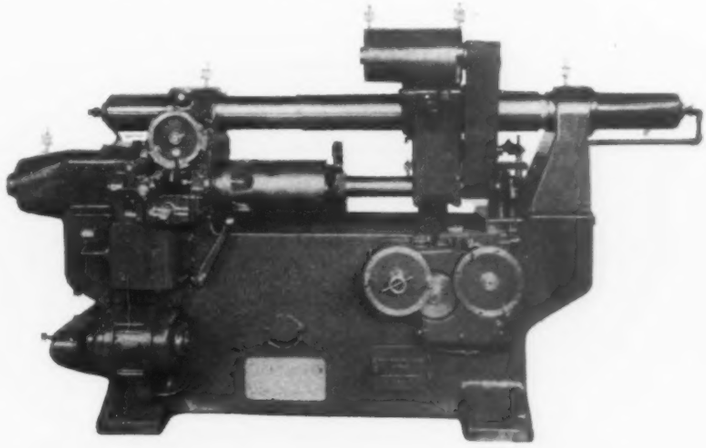
Indexing gears have been eliminated so that no backlash or lost motion is present, which makes it possible to grind on both the cutting and return strokes. Spiral leads to be ground on hobs or cutters are controlled by a sine bar, and by means of a patented arrangement, the machine is said to generate greater helix angles than usual. The carriage has a two-piece bottom plate so that one end may be raised if desired. It is carried on one vee and one flat way and is driven through a crank and elliptical gear, which provides uniform speed during the cut and increased speed on the reversal. The length of stroke may be varied to suit the work. Two speeds are provided for the carriage.

The 10-in. diameter dish-shaped emery wheel employed is driven by independent motor; it is located above the work and is carried on a series of slides attached to the main bed. The wheel spindle is mounted in ball bearings that are made to compensate for expansion due to heating. The up and down adjustment of the grinding wheel is made along a slide at the back of the bed, which is inclined at the same angle as the face of the wheel. When the stone is set at the center of the axis of the work, any vertical motion will carry the wheel radially. The grinding head is also arranged to swivel 45 deg. on either slide to accommodate helical work, and can be moved in and out so that any angle of clearance can be obtained, as well as compensation made for wheel wear.

Automatic feed includes the vertical feed as well as feeding into the wheel in a circular direction. Two 1-hp. constant-speed motors are employed, one for the wheel spindle and the other for driving the carriage and the feed and indexing mechanism. The machine is arranged to permit wet as well as dry grinding. Because of the ease of control one operator can attend several machines.

Heavy-Duty Deep Hole Automatic Sizing Grinder

FOR the production grinding of long and large bores in work that can be revolved in a fixture, the Bryant Chucking Grinder Co., Springfield, Vt., will introduce a motor-driven deep hole grinder designated as the No. 24.



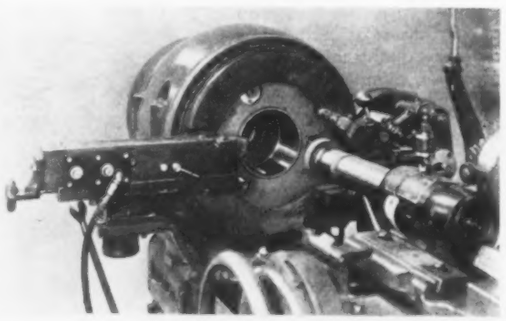
Holding to the same fundamental single slide control of previous Bryant grinders, hydraulic control, automatic sizing and massive design adapt the machine for unusually rapid and accurate production. Three sizes, having 21, 31 and 41-in. swing, respectively, and weighing 7000, 7500 and 8000 lb., net are built. The machine has a stroke of 16 in. and a grinding length of 14 in. The work spindle, of massive design, is 5¼ in. in diameter, measures more than 3 ft. between its Timken tapered roller bearings, and has a speed of 100 and 200 r.p.m. The wheel has a 2-in. face. The wheel-head is driven by a 10-hp., 3600-r.p.m. motor through a 6-in. belt. The work spindle, hydraulic pump, water pump and other parts of the machine are operated by a 5-hp. 1200-r.p.m. motor. The wheel and other driving shafts are mounted in either ball or roller bearings. The length of the machine over all is 11½ ft. and the width, 4 ft.

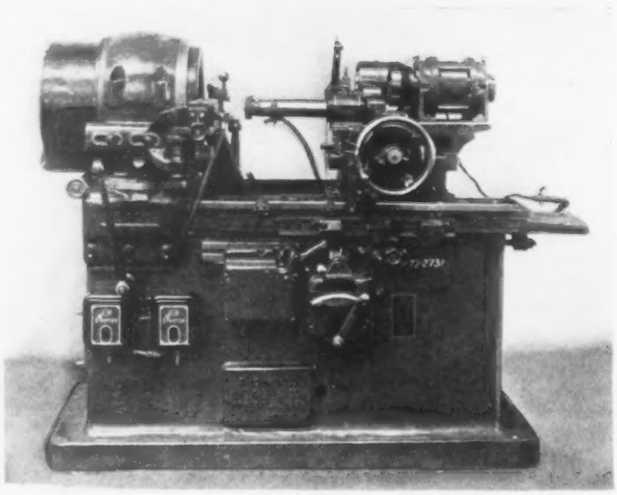
Special Grinder for Airplane Cylinders

GRINDING the bore of the single cylinders used on airplanes and motor-cycles will be among the operating exhibits of the Heald Machine Co., Worcester.

The hole is ground square with the flange and concentric with the skirt of the cylinder on a machine made up of the company's style 72-A internal grinder base, standard hydraulic table drive unit, table dogs and cross-slide, and a special workhead. The cross-slide is elevated 6 in. to give proper height, and has a dovetail way that provides unusually wide bearing surface for a special heavy-duty sleeve-type wheelhead. The workhead carries a spindle mounted on two precision ball bearings, and is driven either by a double-end motor or by belt from a pulley on the rear shaft. The machine is furnished plain or equipped for semi or full-automatic operation.

A major feature is the holding of the cylinder within the workhead, an arrangement that permits use of a short base machine and eliminates the overhang that would be present if the work were chucked in a fixture extending from the spindle nose. Before the cylinder is put into the workhead an adapter ring is bolted to its flange and a bracket with a stud is fastened to its rear. The cylinder with adapter ring is then loaded into the workhead from the left-hand end, and is centralized by five locating pins and guided into position by suitable guide bars. Next, the adapter ring is clamped against five positive stops, hook bolts that are operated from the front of the workhead being used for this purpose. A strap with self-aligning end-support is then slipped over the stud on the bracket at the rear and clamped to the workhead spindle; this serves as a support and steadyrest against pressure of the wheel but does not affect the alinement or location. The operator prepares one cylinder while the other is being ground.





Automatic Milling Machine with Hydraulic Feed

AN automatic hydraulic-feed bed-type milling machine designated as the No. 36 Mil-O-Matic will be introduced by the Oesterlein Machine Co., Cincinnati.

The machine may be equipped with either a plain reciprocating table having a working surface of 21 x 48 in. and 36 in. feed, or with an automatic indexing table of 14 x 24 in. working surface mounted on a slide having 24-in. feed. As an indexing machine the table makes a half turn at the end of its return stroke and advances again to the cut. Single-spindle, duplex, vertical and multiple-spindle types of the machine will be built. Several bed and table lengths will be available and special heads may be applied. Some of the features of the machine and its operation are outlined below; a more complete description, with illustrations, will be included in a later issue.

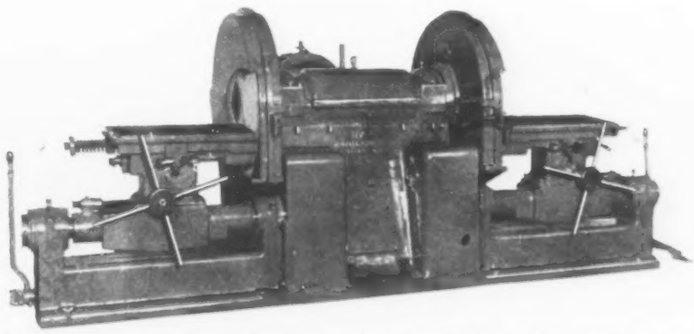
The spindle head carries its own motor; starting, stopping and reversing mechanism and control lever; pick-off gears; and all adjustable controls. Being self-contained, the head can be mounted at any angle to suit requirements. Spindle head gears are of alloy steel, heat treated, are multiple splined and inclosed in grease-tight cases. Anti-friction bearings are used throughout the drive, including the spindle which runs on two 12½ in. and two 5½-in. Timken roller bearings. The starting lever has forward, reverse and neutral positions. In and out adjustment of 8 in. is provided for the spindle, and vertical adjustment of 14 in. for the spindle head.

The direct-motor-driven Oilgear hydraulic unit that actuates the table feed is mounted in the column base. The column and outboard bearing support are interlocked by a heavy tie piece, but where the work is light or on duplex machines the outboard support and tie piece may be omitted and a "vee flat" overarm mounted on the spindle head.

Operation of the machine is automatic after the work has been clamped in the fixture and the quick-advance lever thrown. From quick advance the table slows down to the predetermined feeding rate and at the end of the cut is returned to the starting point automatically at the rate of 180 in. per min. As the table nears the end of the return stroke, a Geneva mechanism unlocks the index table, returns the ratchet and withdraws the table locating plunger. At the extreme end of the return stroke, if set to repeat, the forward quick travel begins again and in the first 2½ in. of forward motion the table is indexed automatically by means of a ratchet. Spindle speeds range from 20 to 242 r.p.m. and feeds, 0 to 30 in. per min.

Semi-Automatic Grinder Handles Heavy Work

DESIGNED to handle large or heavy work at a rapid rate, the new No. 9 40-in. heavy-duty super disk grinder, made by the Gardner Machine Co., Beloit, Wis., and exhibited at the show, operates semi-automatically, eliminating most of the manual labor ordinarily performed by an operator. Its grinding members consist of two 40-in. steel wheels faced with heavy-type Gardner G. I. A. disks, each rigidly supported by a wheel flange 29 in. in diameter mounted on a large spindle measuring 5-7/8 in. in diameter at the bearings. The spindle is carried in Timken bearings and is driven by spiral bevel gears inclosed in a grease tight housing.



The two work tables are adjustably supported on a reinforced box section cast-iron shaft, 3½ in. in diameter at its ends, with outboard bearing housings supported on the floor for their full length. Oscillation of the tables is regulated by hand and foot levers and the work is fed into the cutting member by spring tension. On many jobs one operator can serve both ends of the machine, loading one table while the other is presenting its work to the abrasive wheel. In such cases, production is materially increased, because both the machine and the operator are constantly at work. The machine weighs approximately 16,000 lb. Either belt or direct-connected 25 to 40-hp. motor drive arrangement can be furnished.

Continuous Grinding Machine

BOTH a continuous grinding machine and a surface grinder having a universal head will be exhibited by the Diamond Machine Co., Providence, R. I. The continuous machine was designed for the use of plants having to finish large quantities of pieces of one kind.

Mounted in place of the reciprocating table, of the standard machines, the continuous machine has a large circular fixture (work-head), which revolves across the abrasive wheel. Each chuck mounted on this revolving fixture is rotated by its individual motor. While the work-head is thus revolving across the abrasive wheel some of the chucks are exposed, so that finished work may be removed and rough pieces may be placed in the chuck. Turning of the work-head may be constant or intermittent as required. In either case, the motors rotating individual chucks are started and stopped automatically as the work-head revolves. To care for wear in the abrasive wheel, this is fed forward slightly from time to time.

The photograph illustrates a machine designed for grinding clutch disks. It is intended to finish three a minute and the limiting factor is the speed with which the operator can load and remove the work. The work-head revolves continuously and has eight stations. The machine was equipped with automatic air-operated chucks, but can be had with magnetic chucks when desired.

In another case, with a heavier machine and much larger pieces to be finished, the grinding time averaged about 11 min. to each casting. As there was thus ample time for unloading and re-loading, only two chucks were fitted, being standard, four-jaw, hand-operated units.

Improved Motor-Operated Oscillating Grinder

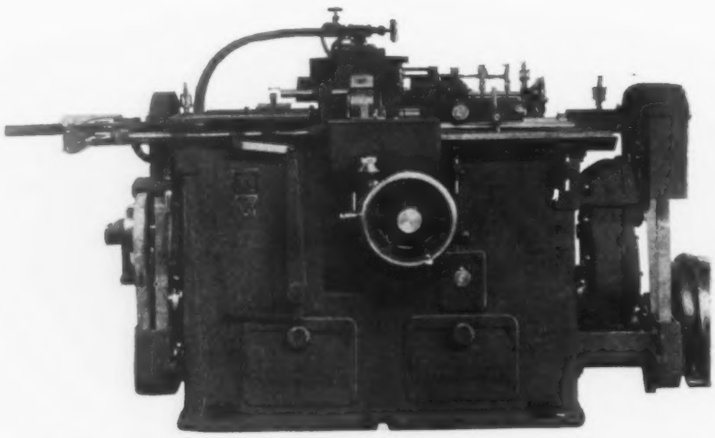
NEW features incorporated by the Van Norman Machine Tool Co., Springfield, Mass., in its new No. 25 type oscillating grinder, to be exhibited at the Cleveland Show, are said to virtually double the production obtained from the older type machines made by the company.

Two motors are employed, one driving the wheel-head and the other the work-head and oscillating mechanism. Full control of the oscillation and rotation of the work head is maintained by means of a lever shift, making it possible for the operator to start the operating part of the machine with only one motion. Ball bearings to the number of 32 are used in the construction of the grinder, bronze bearings for high-speed shafts having been eliminated. Both the work-head and wheel-head have four bearings each.

Improved Automatic Cylindrical Grinder

PRECISION grinders with improved features will be exhibited by the Arter Grinding Machine Co., Worcester, Mass. The No. 132 automatic cylindrical grinder, illustrated, will be in operation on the valve-stem guides, the outside diameter of which must be ground closely concentric with the bore.

The machine grinds by the straight-in feed method and has low angle centers, which enter rather deeply into the bore of the piece, thus providing arbor-like control. Except for loading the work-drum, all operations are automatic. Grinding is done with the full width of the wheel, which is slightly oscillated. Shoulders may be ground, using a special air-operated attachment which provides longitudinal feed of the wheel spindle.



Improvements include longer wheel-slide ways, increased diameter of the hand-wheel through which compensation is made for wheel wear, with means of making adjustments to 0.0001. Texrope type belts are now used to drive the wheel spindle, and the spindle bearing construction has been changed so that adjustments may be more readily made and properly maintained.

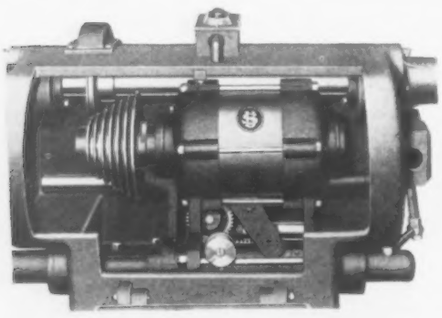
An improved rotary surface grinder, also to be shown, will have a new magnetic chuck with a separable top plate which may be replaced when worn. The working surface of the chuck is broken up into polar faces so that small washers as well as large rings and disks are held equally well. The diameter of the chuck has been increased to 14½ in. Only one coil is used to energize the chuck. A brake mounted on the chuck-spindle is operated by the same lever as the clutch. The main shaft, its loose pulley and the main spindle idler run on ball bearings.

Buffer and Polisher with Four Wheel Speeds

FOUR different wheel speeds, ranging from 2000 to 3000 r.p.m., are obtainable on the new buffer and polisher designated as the Multi-Speed, that will be operated by the United States Electrical Tool Co., Cincinnati.

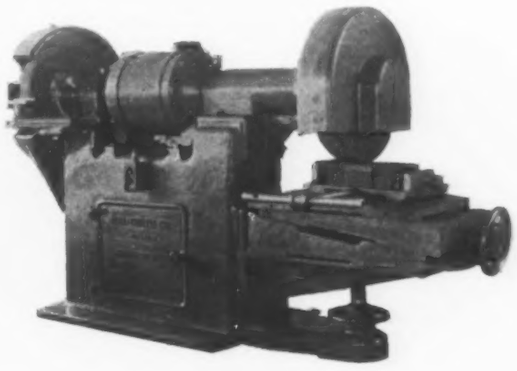
Speed changes are obtained through a Gibbs V-disk transmission of graphitized Micarta. A cone, or series of different size disks, is attached to the motor shaft as shown, the motor, in turn, being mounted on a rocker arm that permits it and its driving cone, to be swung forward and to be moved parallel with the wheel spindle. The Micarta disks drive a sationary metal V-disk or sheave on the wheel spindle; for speed changing they are brought into driving contact with the spindle sheave simply by releasing the motor and cone by means of a foot pedal and moving the cone to the proper position by means of the lever at the front of the machine. Speed changes may be made only when the motor and spindle is not in motion.

The chrome-manganese steel wheel spindle is mounted in four heavy-duty ball bearings which are inclosed in labyrinth seals in dust-tight grease compartments. The motor operates at 3600 r.p.m. and is controlled by push button, overload protection and no-voltage release being provided. The machine is built in four sizes, equipped with 1, 2, 3 and 5-hp. motors respectively.



Machine Grinds Radius on Journal Wedges

FOR grinding the radius on both new and worn journal wedges the Hill-Curtis Co., Kalamazoo, Mich., will exhibit an F-B journal wedge reclaiming machine operated by a 5-hp. motor. The tool consists of a profile block and machined surface to the machine surface of which is fitted a chuck that holds all standard A. I. A. wedges. This chuck, with journal wedge locked arm, projects toward the front of the machine and is guided under the wheel by means of a feather key which fits in guiding slots planed in the top of the profile block. After one section of the wedge radius is ground, the chuck is moved over on the profile block until the feather key in the chuck slides in the next slot. This operation is repeated until as much of the surface of the wedge as necessary is ground to reclaim the proper radius.



The amount to be ground from the wedge is controlled by the hand wheel at the extreme right of the machine which operates the screw that moves the adjusting block between the profile block and the base of the machine on an inclined way, thereby raising and lowering the wedge in relation to the grinding wheel. The wedge reclaiming end of the machine can be raised and lowered to compensate the wear by means of a vertical screw and hand wheel. The straight-faced wheel on the left-hand end of the reclaimer can be used for general purpose grinding. The right-hand side grinding wheel for grinding journal wedges is concave, but the left-hand wheel, 3 x 18 ft., is straight-faced for tool and production grinding.

Floor Stand Grinder Operates at 9400 Ft. per Min.

THE new high-speed floor stand grinder illustrated, developed primarily for economical rough grinding of aluminum, brass and bronze castings, will be displayed by the Marschke Mfg. Co., Grinder and Buffer Division of the Black & Decker Mfg. Co., Towson, Md.

Grinding wheels are 20-in. in diameter, have a 10-in. center hole and operate at a surface speed of 9400 ft. per min. The drive is by a 5 or a 7½-hp. inclosed a. c. or d. c. motor. The spindle is carried on ball bearings located on each side of the motor and also at the extreme ends of the spindle, and labyrinth seals protect each bearing from abrasive dust and leakage of grease.

Features of the base include its weight, 1700 lb. for the 5-hp. 20-in. machine, rounded out corners to provide more ready access to the wheels; and a deep flare to provide maximum stability. The rugged and symmetrical design, together with the method of spindle mounting, is emphasized as eliminating vibration and increasing wheel life. Wheel guards are electric steel castings and have hinged inclosing covers. The work rests, mounted on the wheel guards, are adjustable by means of hand screws and lock to compensate for wheel wear. The guards have a sliding adjustment at an angle which assures that the front top of the wheel guard maintains the same distance from the work-rest, thus providing automatic spark protection. The guards being universal, the openings can be brought to any position and locked by means of a lever.

Browne & Sharpe Milling Machines

IN addition to its latest No. 30 and No. 32 plain grinders, the Brown & Sharpe Mfg. Co., Providence, will have in operation the new No. 2A universal, the No. 2 vertical and the No. 4B plain milling machines of its "standard" line, which has been described at length in recent issues of THE IRON AGE.

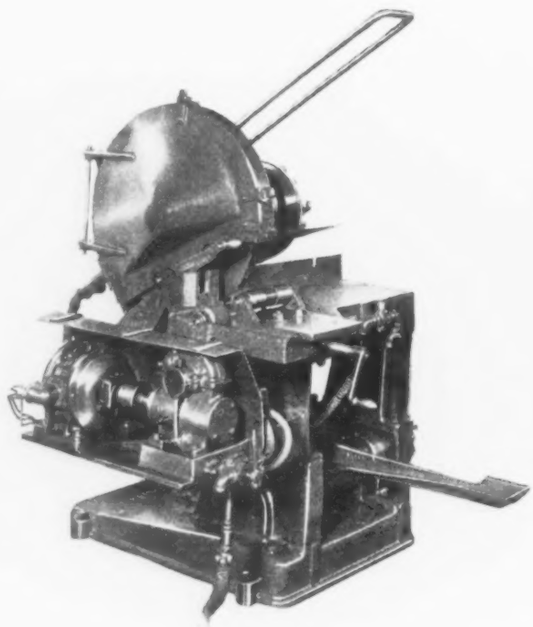
The No. 00G high-speed automatic screw machine equipped with automatic rod magazine will be a feature of the company's screw machine exhibit. A comprehensive line of small tools will be on display.

Friction Saw Attachment Eliminates Burr

A NEW rotating attachment that eliminates the burr in cutting round tubing, pipe and bar stock will be shown by Joseph T. Ryerson & Son, Chicago, in connection with its No. 0 friction saw which was designed for high production in cutting the smaller sizes of materials.

The rotating attachment increases the capacity and reduces the load on the motor. It consists of a special work-table on which supporting rollers are mounted, for holding the stock in position while being cut. One set of rollers is driven through a speed-reduction unit and gearing from a small motor. A second set is mounted on an adjustable bracket, which may be moved in or out to accommodate the stock.

By means of an air cylinder arrangement a third roller is brought down on top of the stock, holding it firmly in position while it is being rotated. This attachment provides rotation at constant peripheral velocity for any size of round stock. It eliminates necessity for chucking and for change-speed gears. The machine may easily be adjusted for cutting structural shapes by dropping off the drive rollers and replacing the adjustable bracket with a work-table plate. The drive is by 10-hp. 3600-r.p.m. motor. A 24½-in. saw blade is employed.

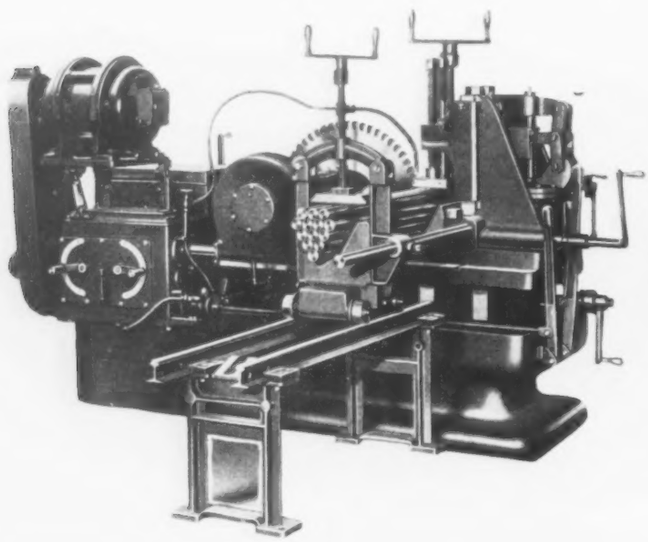


Other new equipment, to be illustrated in a later issue, includes a flue cutting and polishing machine and a flue roller.

Sawing Machines for Steel and Non-Ferrous Metals

MULTIPLE cutting of round steel bars will be demonstrated by the Cochrane-Bly Co., Rochester, N. Y., on its new No. 55 motor-driven metal sawing machine equipped with single compound toggle air clamp and multiple cutting fixtures.

The machine features roller-bearing driveshafts and hardened nickel steel driving gears that run in oil. Cutting speeds of 42, 60, 75 and 90 ft. per min., and 16 geared feeds ranging from ½ to 10 in. per min., are obtainable. The feed has a safety clutch to guard against breakage due to jamming of the carriage or other parts. A 7½ hp., 1200-r.p.m. motor is employed. With 24-in. saw blade the machine will cut 7½-in. round and 6½-in. square bars; the capacity of 60-deg. fixtures for multiple cutting ranges from 76 ½-in. bars to 4 3-in. bars. The machine weighs 4500 lb. net.



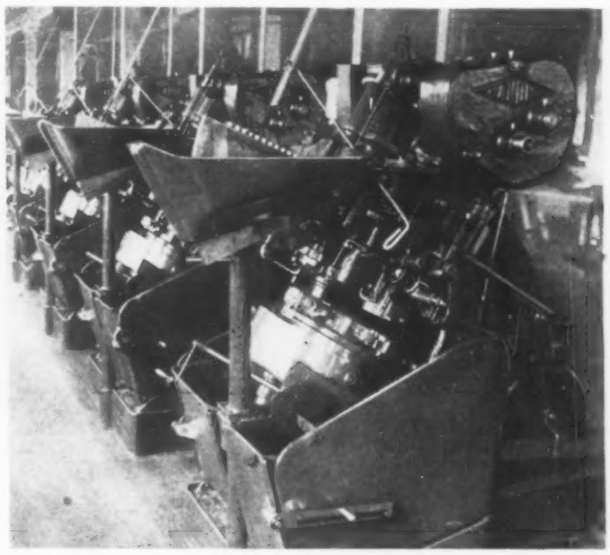
A 10-in. metal sawing machine, designated as the No. 66, with Oilgear hydraulic feed, duplex compound toggle air clamp and flood lubrication of blade will also be in operation, as well as a No. 21 automatic saw for cutting non-ferrous metals. The latter is equipped with multi-speed motor drive to the spindle, individual motor drive to the gear box and an automatic bar feed device. The latter is separately driven, and will feed 4 in. with the machine operating at 50 strokes per min.

Improved Automatic Forming and Threading Machine

AN escapement attachment for use in connection with long hexagon and square-head bolts, and bolts and screws having off-shaped heads, such as rim, plow and step bolts has been designed by the Landis Machine Co., Waynesboro, Pa., for its automatic forming and threading machine.

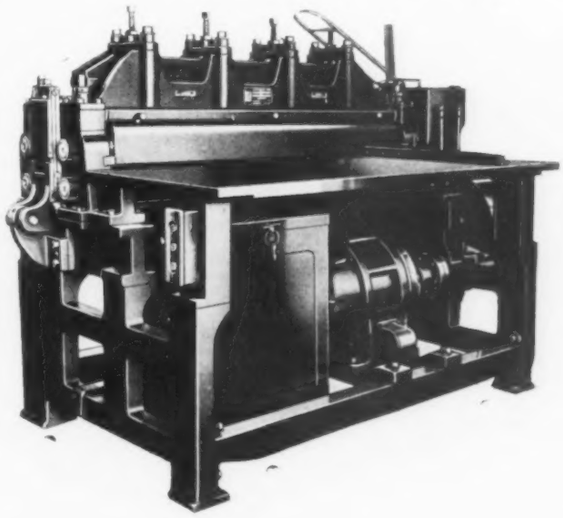
This attachment, built into the magazine, releases one bolt at a time at the end of the magazine, thereby relieving the bolt to be transferred to the chuck turret of the weight of the bolts in the magazine and preventing interference of bolt heads. It covers the entire range of machines from 5/16 to 3/4 in. in diameter and 1 to 6 in. in length.

The machine to be exhibited will also be equipped with a new conveyor to deliver the bolts to the handling boxes. The conveyor is perforated and has an oscillating motion to move the bolts slowly towards the handling boxes, allowing most of the coolant to drain off of the bolts. The coolant is collected in the trough under the conveyor and returns to the sump in the bed. Small chips are also separated from the bolts, the chips dropping through the perforations in the conveyor as the bolts move along. The conveyor can be arranged to deliver the bolts either at the front or rear of the machine.



Improved Rotary Gang Slitting Machines

IMPROVED Putnam "type K" slitting machines, the heaviest type of the three types manufactured, will be exhibited by Manning, Maxwell & Moore, Inc., New York. An important feature is the method of mounting the cutter shafts and cutters to eliminate bending strains, and thus assure accurate cutting of the sheets into strips.



The cutter frame is interposed between two sets of feed rolls and carries two cutter shafts. It is arranged to swing out from between the rolls, thus providing accessibility for setting up and adjusting the cutters. The solid cutter frames, which are standard, are designed to use chair type cutters fitted into chair shaped bearings that are clamped rigidly to the cutter frame. The cutter frame, in turn, is fitted to the bed and clamped in position from above by means of a "strong back" between the uprights of the main frame. The chair type cutter bearings are bronze bushed and are fitted with flush type grease cups for pressure gun lubrication. This type of cutter must be ground on the side because the center distance between the cutter shafts in the solid type frame is fixed.

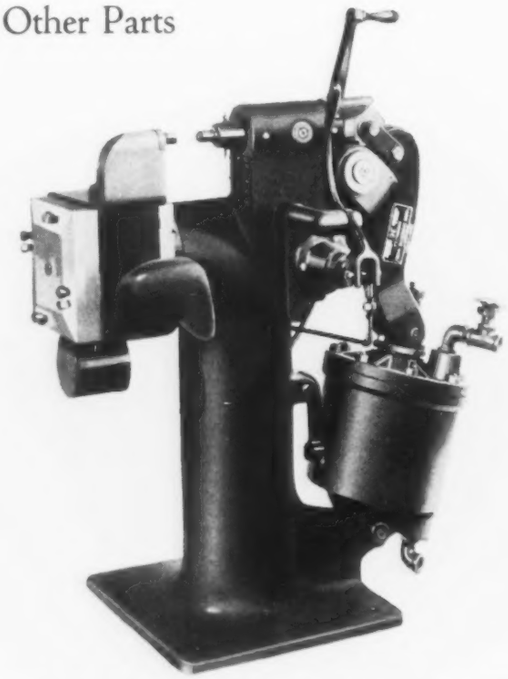
Adjustable cutter frames with block type cutters can be furnished special for cuts that are narrower than the minimum width with chair type cutters. The top cutter shaft is adjustable in a vertical plane, parallel with the lower cutter shaft, which permits grinding the block cutters on the periphery and to the exact width of cut required.

Intake and discharge rolls have adjustments by which they may be set apart slightly less than the thickness of the stock to be cut. A tension mechanism is provided to permit passing of stock that is thicker than the space between the feed rolls. The discharge rolls are hardened and ground to resist cutting of the rolls by the edges of the cut strips. Both sets of rolls are positively driven by gears.

Cold Rivets Chassis Frames and Other Parts

COLD riveting of automobile chassis frames and sub-assemblies will be demonstrated by the Hanna Engineering Works, Chicago, on a group of its "Rapid" type riveters which are built in a range of types and sizes and in capacities from 6 to 20 tons, for driving 3/16 to 3/8-in. rivets cold.

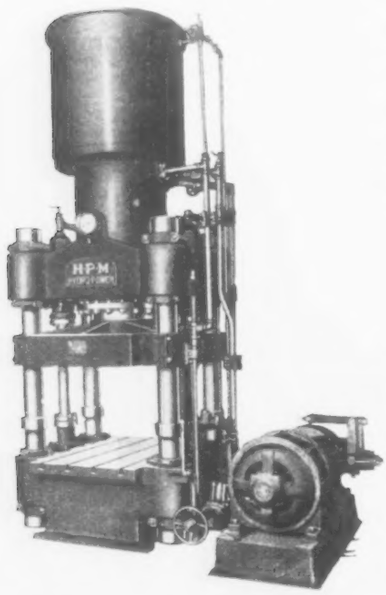
The machines will include the turret riveter illustrated. The rotating head mounts four horns or noses, any one of which, with its stationary die, may be indexed into alignment with the movable die on the plunger or ram. These noses enter the inside of the chassis frame, and because the clearance conditions at one rivet are frequently quite different from those at another rivet, the noses or horns are made in various shapes. From the standpoint of the variety of horn or nose clearance conditions met with, this machine combines in one unit four riveters of like reach, gap and tonnage. Production depends upon the number or frequency of indexes, but averages approximately 500 rivets an hour. A similar machine mounted on a swiveling base is also built.



A basic feature of these riveters is the simple lever and toggle mechanism which provides a long die stroke with wide range of uniform pressure, thus eliminating the necessity of screw adjustment of the die. The initial movement of the die is rapid, the speed gradually decreasing until the die enters the uniform pressure portion of the stroke. As the rivet head forms, the pressure increases to maximum, where it remains during several inches of piston travel. This dwell takes care of ordinary variations in rivet lengths and plate thicknesses.

Hydraulic Forming Press Completes 10 Cycles per Min.

RAPID operation, ease of control, variable working stroke and low power consumption are features of a new hydraulic forming press that will be shown by the Hydraulic Press Mfg. Co., Mt. Gilead, Ohio. The maximum pressure capacity of the machine, which is intended for forming and drawing in heavy gage metal, is 500 tons.



The machine is self-contained and is powered by an electric motor which drives a radial-type hydraulic pump. Operating pressure is adjustable over a wide range and the hydraulic control mechanisms may be set either for semi automatic or full automatic operation.

The semi-automatic cycle is started by tripping the starting lever or pedal, which causes the platen to travel rapidly downward. As the platen closes on the work it automatically slows down to full load rate, the pressure building up to a predetermined limit. The motion of the press is then reversed automatically and the platen returns at fast speed to an adjustable upper position, at which it stops. The full automatic cycle is the same except that operation is continuous until stopped by the operator. An operating speed of 10 cycles per min. on a 6-in. working stroke is readily maintained.

The machine is made in several standard sizes and pressure capacities, the operating speed of each of the different sizes being inversely proportional to the total pressure capacity.

Ball-Bearing Motor-Driven Trolley

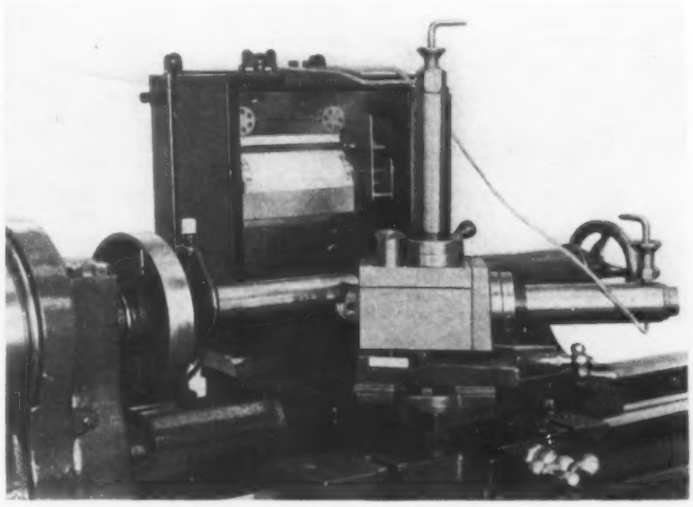
A NEW motor-driven trolley that operates at an average speed of 150 ft. a min. when loaded will be among the new equipment shown by the Yale & Towne Mfg. Co., Stamford, Conn. A ¾-hp. ball-bearing compound-wound direct current motor or a high torque, squirrel cage polyphase alternating current motor is used. The controller is of single-speed drum type, manually operated, but push-button contactor type can be furnished. Power is supplied either by a flexible cable for short runs or by overhead conductor wire and adjustable wheel type collectors.

Designed to provide the shortest headroom from the underside of the I-beam to the highest point of travel of the hoist hook, the trolley is adjustable on six sizes of I-beams from 8 to 18 in. Four roller bearing wheels provide smooth operation. Remote push-button control can be arranged. Heavy steel suspension plates provide for attaching hoist or chain block.

Determines Machinability of Metals and Efficiency of Tools

AN instrument known as the Machinabilimeter, uses for which include testing the machinability of metals, determining the best form of tool edge and cutting speeds and feeds, and the proper kind and amount of cutting compound for different materials and heat treatments, will be introduced by the Hall Planetary Co., Philadelphia.

The device, illustrated herewith, records the power consumed at the cutting edge of the tool; it is simple to operate and may be used in connections with lathes, planers, milling machines or grinders. Machinability tests are most readily made on a lathe, the piece to be tested being held between centers and the instrument mounted on the cross-slide. The cutter of the instrument is then brought in contact with the piece to be tested, and a cut of predetermined depth and feed taken. Thus the machinability of the metal is tested under actual working conditions, and the piece as a whole shown to be up to standard, or defective in that it contains hard and soft spots. Several short pieces of different material, or of the same material but different heat treatments, may be held on an arbor and tested.



Tools of button type with several cutting edges, these edges having different rake angles, etc., may be used to find the most economical form of tool edge for given conditions. Likewise, for a given tool and material the most economical feed and depth of cut can be determined; also whether a rough finished cutting edge or a polished edge is most suitable, and the effects of wear of tools on the economy of operation. The effect of different cutting oils and compounds on the cutting ability of tools may also be studied.

On a grinder, the device may be used to determine the pressure necessary to hold the grinding wheel against the work; on a milling machine, to determine the pressure required to drive the work into the cutter and vice versa.

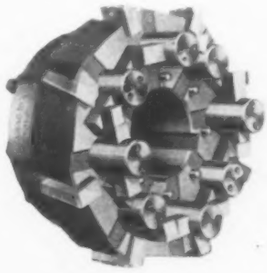
Boring Head Permitting Several Operations at One Set-Up

EXHIBITS by the Gairing Tool Co., Detroit, will include a boring head having tools that swing to and from the cutting position and may be very accurately set. The arrangement permits cutting large diameters, then reducing to smaller, passing through the job and again cutting the large diameters on the opposite end; it also permits finishing of various diameters on the return stroke. The tool is said to relieve the operator of responsibility for accuracy, because all blades are ground in position in one set-up, assuring concentricity of all cutting edges in relation to the axis of the boring head.

Inserting of reground and of new tools is simple. The blade is put in position, and calipers used to determine the dimension from the point of the blade to the opposite side of the boring bar; half the diameter of the bar is subtracted, the result being the radii on which the point of the tool will travel.

Swinging the tool to and from the working position is also simple. Set screws, shown in the front view illustration, hold each blade in position in its draw bar. The latter has a square end at the rear and a nut for drawing the blade snugly into the location slot at the front of the head. When this nut is loosened, a spring lifts the cutting tool free of the locating slot. The tool is then turned in or out of work position by means of a wrench applied to the square end of the draw bar.

Six sizes of this boring head are made. The head illustrated, equipped with inserted blades on its periphery, is designed for completing all boring operations on dual locomotive valve chambers in one set-up.



Electrically Power-Operated Lathe Chucks

INTERNAL and externally-operated chucks for both inside and outside work actuated by electric motor will be shown by the Union Mfg. Co., New Britain, Conn. Uniform pressure with minimum distortion of the work are advantages claimed, as well as rapid operation and minimum effort on the part of the operator. Power consumption is said to be small and use of the chuck frequently enables one operator to attend several machines.

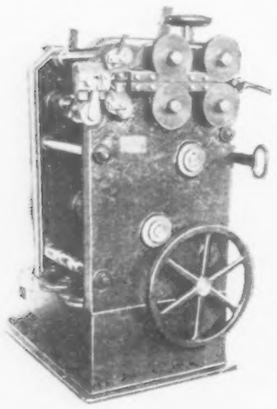
The externally-operated chuck is for both chucking and bar work, the internally-operated is for chucking work only and is provided with bushings for pilot bar. Pressure, ranging from 500 to 6000 lb., may be

varied to suit requirements. Control may be either by hand or foot. Push-button control is provided for the internal-jaw chuck, the external-jaw chuck being operated by a lever that opens and closes the jaws automatically. Solid and reversible top and special jaws can be furnished. The jaws are so made that when top jaws are removed bottom jaws are suitable for bar work.

Five sizes of the chuck, ranging from 10 to 22 in. are manufactured. All parts are of steel, working parts being of chrome-nickel steel and heat-treated.

Improved Spring Coiling Machine

THE spring coiling machine to be exhibited by Sleeper & Hartley, Inc., Worcester, Mass., while not entirely new, is of improved design.



The wire is gripped between feed rolls and is fed forward against the coiling tools, being rolled by deflection into the helical form.

A pre-determined length of wire is put into each spring. The cutting mechanism is automatic, each spring, as produced, being cut off at once. The machine will handle either round or square wire. Changes from one form of spring to another are made in from 10 sec. to 20 min., the time depending upon the complexity of the form. Springs may be wound either right or left hand, open or close coiled, of various diameters, coned with any degree of taper, with variable pitch, barrelled with any desired crowning, to almost any variable contour, tapered at one or both ends, and with one or more coils closed at one or both ends of the spring.

In operation the driving shaft pinion meshes into a crank gear, which drives an oscillating segment geared to a ratchet. The ratchet shaft drives the wire-feeding devices. Each stroke of the segment gear moving in one direction feeds a definite amount of wire. On the return stroke the feeding mechanism is stopped, giving the cutting mechanism time to cut off the spring just produced.

Eleven sizes of the machine, with capacities ranging from wire of 0.004 in. to ⅝ in. diameter, are built.

Small Electric Lift Truck for Congested Quarters

TO turn corners of 4-ft. aisles and to work in congested quarters, a light-duty small electric lift truck has been developed by the Elwell-Parker Electric Co., Cleveland. The machine is rated at 3000 lb. capacity;

it handles skids now used with hand lift trucks.

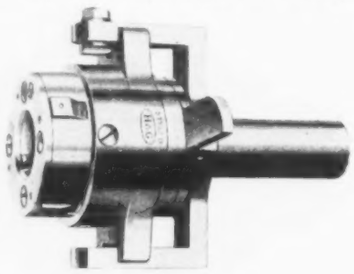
This truck is only 28½ in. wide and 83 in. long, and is low over the battery compartment, although the controls are retained at the usual height for the comfort of the operator. The lift platform is a single ⅜-in. plate bent and welded into a rigid, nosed skid support. It is nosed so that it may be eased under a loaded skid from an angle, such as a pick-up from the side of the aisle. The platform is backed at the rear with a heavy skid bumper angle surmounted by a ⅜-in. bumper plate with guide pin in ⅜-in. load dash extending the full width of the power end of the truck. The standard size of platform is 18 x 41 in. and 7 in. high, while the lift is 3½ in.

The ball-bearing, steerable trail wheels are fitted with 6½ x 4-in. rubber tires. Practically all steering connections are of the ball and socket type. The steering handle is on the operator's left and is of the vertical or pump-handle type, being pushed down to steer in the direction in which the operator leans when making a turn.

Travel controller is mounted on bent plate dash in front of operator and is actuated by a removable handle when the operator stands on the two pedals or on the divided platform. One pedal locks or unlocks this controller as the operator steps on or off, and the other pedal actuates the brake.

New 5/16 In. Die Head for Small Machines

FOR use on B & S No. 00 screw machines and other small automatics the Eastern Machine Screw Corporation, New Haven, Conn., will offer a new 5/16-in. die head, designated as the style D. This head has stronger



and heavier chasers than the ¼-in. size, and is intended to enlarge the threading range of the small machines for which it is intended.

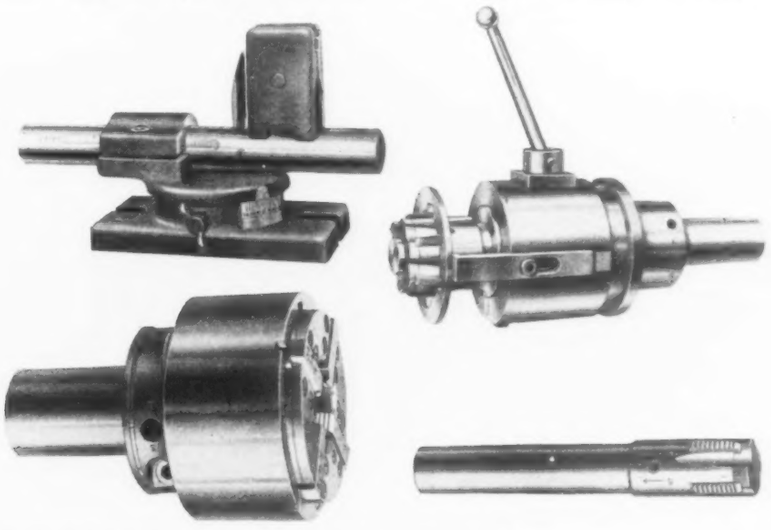
Among other styles of die heads, the new style EE sleeve-operated head for rotary spindles will be shown. Improvements in the H & G line include ground chaser cam holes in the body of the heads to provide maximum support for the chaser cams.

An improved chaser grinder with driving motor contained within the pedestal base, as shown in the illustration, will also be featured.

New Threading Tools

FOUR entirely new products will be exhibited by the Geometric Tool Co., New Haven, Conn. These include a class SJ solid adjustable tap, a class R receding chaser tap, a style KJ solid adjustable die-head and a universal chaser grinding fixture.

All working parts of the solid adjustable tap, even the size adjustment mechanism, are in the nose or front end. Thus, that portion of the tool carrying the chasers is the largest diameter of the tap, allowing it to cut threads to any required depth. This tap has simply a body, a plunger to hold the chasers in place, a couple of adjusting screws working on the plunger and a cap supporting the chasers.



The receding chaser tap was designed for taper threads of great depth and steep taper, cut in tough materials. All working parts are fully inclosed. The taper advances on the work as a jam cut tool. After the chasers have taken hold, an adjustable taper bar, working through a pawl on to the chaser plunger, causes the chasers to recede as they advance into the work. At a predetermined point the chasers collapse and the tool may be backed out.

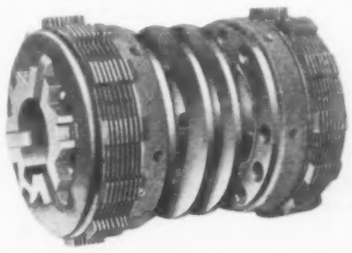
An important feature of the adjustable die-head is the accessibility of the size adjustment mechanism, permitting adjustment to be made without removing the tool from its holder. This mechanism is securely locked in place so that the die-head will not change its size, even when suddenly and repeatedly reversed at high speeds. Chasers may be quickly replaced by means of a thumb release on the back of the tool.

The universal grinding fixture can be used to grind chasers on both the cutting face and the chamfer. Milled chasers, tapped or hobbed die-head chasers and collapsing tap chasers may be re-ground with equal facility, though these chamfers are flat, concave or convex. The cutting faces of these different chasers may be given the required angle of hook or snub for the work to be done.

Multiple-Disk Clutches That Run in Oil

A MULTIPLE - DISK clutch designed to run in a spray or bath of oil will be introduced by the Twin-Disc Clutch Co., Racine, Wis. Designated as the type CC, it is made in a number of sizes from 3½ to 6 in. effective diameter of friction disks, in steps of ½ in., and also in 7, 8, 9, 10 and 12 in. effective disk diameter.

All parts of the smaller clutches, except the hard rolled phosphor bronze driving plates, are machined from the bars and steel frictional surfaces are hardened and ground. Centrifugal force operates to release the pressure levers, which are housed in the hub itself and are operated by sliding wedges that are also guided and housed in the hub. No cotters or similar devices are used in the assembly, and it is said to be impossible for any part of the clutch to become detached without deliberate disassembly. Compactness is a feature, and when installed there are no projecting parts. The method of adjustment employed in other clutches made by the company is retained in the larger sizes, and is applied in a modified form to the small models of the CC clutch. The construction lends itself to duplex operation.



⅞-In. Sensitive Drill Capable of High Speeds

RESERVE capacity to permit driving four ⅞-in., or equivalent, tungsten carbide, as well as the same number of high-speed steel tools, is claimed for a new four-spindle "Hi-Power" sensitive drilling machine to be exhibited by the Henry & Wright Mfg. Co., Hartford.

Although intended for production operations, the machine has long bearing surfaces dynamically-balanced rotating parts, and other features that adapt it for toolroom work. As exhibited, it will have three spindles driven by belt from a motor in the base and one spindle driven from a 1½-hp. motor on the rear of the column. Of three hand-feeding spindles, one will be equipped with ball-bearing back gear attachment; the fourth spindle will be furnished with a new full-automatic power feeding mechanism.

The base of the machine houses the motor, and contains the coolant reservoir. The spindle sleeve has an inserted nickel-steel rack mounted so that all load is transmitted directly to the sleeve instead of to dowels. The alloy steel spindle is ground to size and dynamically balanced. At its upper end it has six splines, which are said not only to provide sufficient surface to drive ⅞-in. drills under heaviest cuts, but also to give low unit bearing pressure on those driving surfaces so that the drill has the sensitiveness necessary for drilling very small holes.

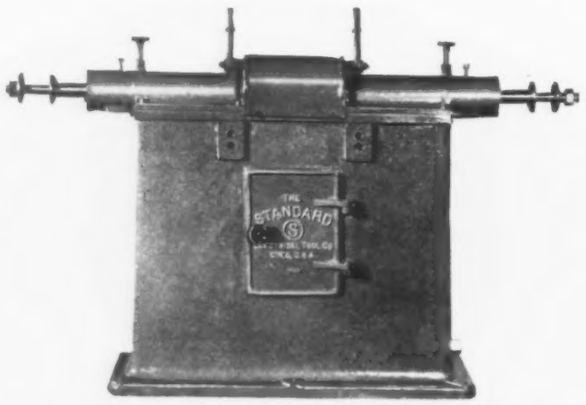
One large double row ball bearing is used at the lower end of the sleeve, and a single row ball bearing on the upper end. Lubrication of these bearings is by means of a wick in the cap on the upper end of the spindle sleeve. This cap holds sufficient lubricant for 10-hr. continuous operation, and the height of the oil is visible through a sight glass. It is stated that when the machine is in operation the upper ball bearing operates in a fog or mist; when it is stopped, most of the oil collects in a groove in a deflecting collar, but enough escapes to lubricate the lower bearing. When the machine is started, the oil in the deflector collar is thrown into the upper bearing, so that at no time is this bearing without proper lubrication.

Four spindle speeds, from 620 to 1000 r.p.m., are obtainable and four more, from 150 to 450 r.p.m., by means of the backgear attachment.

Two-Motor Buffing and Polishing Machine

TWO driving motors, one for each wheel, are used on the buffer and polisher illustrated, which will be shown by the Standard Electrical Tool Co., Cincinnati. Each motor is mounted on a hinged plate in the base of the machine, and each plate has an adjustable screw to take up belt slack. The Dayton cog belts used, run in V-grooved cast iron pulleys. Speeds ranging from 2000 to 3000 r.p.m. are obtainable by changing pulleys on the motor shaft. The machine is made in 3, 5 and 7½-hp. sizes.

Spindles are of nickel steel and are mounted in ball bearings which are inclosed in dust proof chambers and run in oil. Each spindle is fitted with a hand brake for quick stopping and also a shaft lock for use when changing wheels. Spindles of various lengths can be furnished. The motors are ball-bearing equipped and have independent push button control. The back of the machine is of sheet metal and is hinged so it may be raised, permitting full access to all parts.

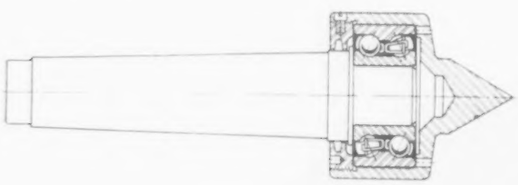


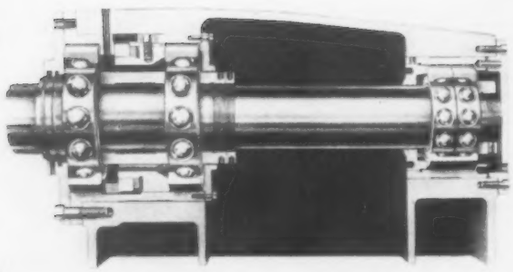
Ball Bearing Spindles and Live Centers

EXHIBITS by the New Departure Mfg. Co., Bristol, Conn., will include a heavy-duty spindle mounted on four ball bearings and a live center having double-row angular contact ball bearings.

The spindles also have bearings of the angular contact type, capable of resisting in thrust twice their rated radial capacity. The pair at each end are set up opposed to each other, with the bearings pre-loaded so that all radial and end play is eliminated. This spindle is so designed that it may be assembled and the bearings pre-loaded before being placed in the machine frame. It is capable of operation at the highest machine speeds and, when properly installed, requires no adjustment and practically no lubrication attention. It is said that it virtually eliminates chatter, and prolongs the life of cutting tools.

The live centers are assembled also in a pre-loaded condition. This feature, being built in during manufacture, is a permanent characteristic and not subject to change in use. This center is said to reduce chatter and to permit working at the highest speeds of which the lathe and other tools are capable. The work is brought very close to the supporting bearing. The seal is on the side opposite the work, thus reducing probability of cutting compound or chips getting into the bearing. The center is non-adjustable.





Bends Angle Iron Rings with the Leg In

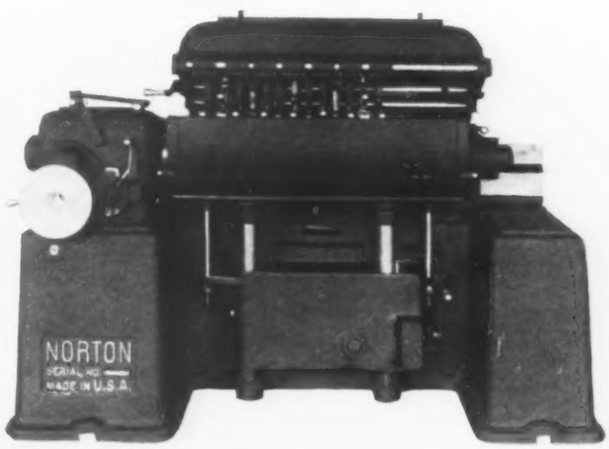
BENDING rolls shown by the Buffalo Forge Co., Buffalo, will be equipped with a new device that permits bending angle iron rings with the leg in, in a single pass through the machine and without the necessity of a preliminary bend.

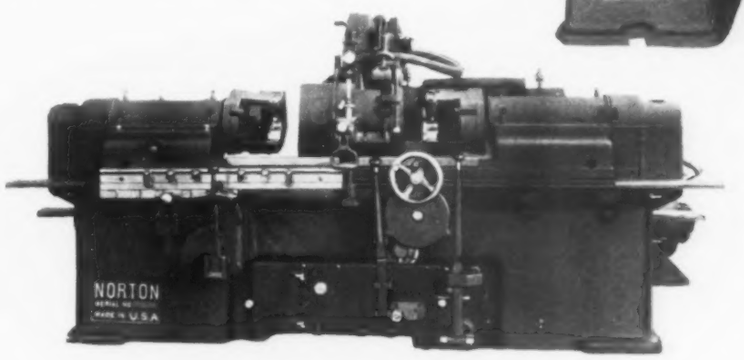
Heretofore in bending angle legs in, it has been necessary to stretch the outer leg by a preliminary bend, thus compensating for the material which is compressed when bending a ring with the leg in. The device also serves as a gage, and is useful for opening up rings bent to too small diameters. It can be applied to Buffalo benders now in use.

Crankpin Grinder with Features That Facilitate Operation

THE Norton Co., Worcester, Mass., will have in operation a new double-head crankpin grinder with features intended to minimize the operating hazard and the manual effort in its operation. Action of the work-holders, table and wheel-slide are hydraulically controlled and, by means of an interlocking device, these units are interdependent. One cannot be moved while either of the others is in operation.

Arrangement of the steadyrest, another feature, is such that when the rest is unclamped from the table it moves upward, affording easy access to the work. The upward movement





also stops the flow of lubricant, although this may be renewed if desired by manual control. Attached to the rest are splash guards and a Pratt gage, which also move with it in or out of the operating position. This mechanism facilitates operation and makes unnecessary the lifting of work over the steadyrest in loading or unloading the grinder.

The base of the machine has been designed so that work is supported much closer to the operator and somewhat lower than usual, permitting crankshafts to be handled without the assistance of an overhead hoist. Workholder spindles are synchronized and driven by two silent chains controlled by idler sprockets. The right-hand head is stationary, while the left has lateral adjustment to permit maintaining proper alinement of the crankshaft. The work is gripped in hydraulically-operated clamps and failure of the hydraulic mechanism does not release them. Locators on the workholders control the angular and endwise location of the pins in relation to a prescribed indexing position on the crankshaft.

The machine may be set for a crankshaft with four, six or eight crankpins, a spacing bar and dogs, with positioning slots, locating the lengthwise position of the work-table for grinding each pin. Slow movement of the table is provided for truing the grinding wheel. The wheel-slide has four adjustments: Fast motion to the shoulder of the pin; controllable feed down the shoulder to the body; fast return to the extreme rear position of the slide; and slow motion in both directions for truing the sides of the wheel. In this operation hand feed is employed.

One motor drives the machine. The swing is 17 in. and six sizes are built.

Improved Crankshaft Lapper Also to be Demonstrated

An improved crankshaft lapping machine with mechanical elevating table for raising and lowering the work will also be shown. The crankshaft is placed on supporting blocks on a table 28 in. from the floor and raised mechanically into alinement with the headstock and tailstock. It is instantly located with the driving-pin. No great amount of lifting is left for the operator. When the lapping operation is completed the shaft is mechanically lowered clear of the lapping arms for inspection.

Lapping time is also mechanically controlled, the mechanism being set to lap for a given time, at the expiration of which the work stops. By this method each shaft is lapped an exact predetermined time. Greater ease of operation and a greater degree of uniformity of finish is claimed.

Design of the lapping arms, which are now counterbalanced and suspended from a vertical position so that the weight of the mechanism has no influence on the lapping action, is another improved feature. The arms, with minor adjustments, may be adapted to any crankshaft.

This machine, intended for lapping all main bearings and crankpins at the same time, has a capacity for crankshafts up to 42 in. long. Abrasive paper, cast iron laps with loose abrasive or abrasive sticks, may be used.

Widia Tungsten-Carbide Tools Will Be Demonstrated

IN addition to tungsten-carbide lathe tools, Widia tools for boring and rock drilling operations, drills for hard and highly abrasive materials and reamers will be shown by Thomas Prosser & Son, New York. Wear resisting bushings and grinder centers will also be displayed.

High-speed cutting of chilled cast iron, manganese steel and other materials difficult to machine, as well as interrupted or jump cuts in a cast-iron slotted shaft having a Brinell hardness of over 200, will be featured. Cutting of the slotted shaft will be at a speed in excess of 650 ft. per min., a feed of 0.036 in. and depth of cut of $\frac{5}{8}$ in. The slots in the shaft cause about 400 blows per min. on the edge of the tool.

The present status of cemented tungsten-carbide tools and dies will be discussed by Dr. Zay Jeffries, consulting engineer, General Electric Co., at a meeting to be held by the machine-shop practice division of the American Society of Mechanical Engineers at the Hotel Cleveland, Cleveland, Oct. 1. This session is one of several arranged for the week of the National Machine Tool Exposition.

Steel Floor Plates Used for Diesel "Yarders"

A new use for non-skid floor plates has been found by the Central Iron & Steel Co., Harrisburg, Pa., which has supplied this product for the platforms of Diesel engines used in the lumbering district of the Pacific Northwest. These Diesel engines, called "yarders," are used in all kinds of weather, and as the operators on the platforms work 8 ft. above ground the danger of accident is present when there is snow, sleet or rain. The use of floor plates, it is stated, will remove this danger.

In producing floor plates for this purpose, the Central Iron & Steel Co. flanged them without distortion to an angle of 45 deg. while cold, said to be an unusual accomplishment with floor plates of this character.

Electric Furnace Used to Study the Stars

At the coming convention of the American Electrochemical Society to be held at the William Penn Hotel, Pittsburgh, Sept. 19 to 21, Dr. Arthur S. King of the Mount Wilson Observatory, Pasadena, Cal., will describe the results of his years of painstaking investigations on the spectra of the stars.

A special electric vacuum furnace was developed by Dr. King for this purpose, which rendered metallic vapors luminous. High temperatures alone appeared to be necessary to produce the large variety of spectroscopic phenomena observed. No definite type of chemical action has appeared to be necessary. Metallic vapors near the melting point produce a spectrum consisting of a few lines. At higher temperature stages, other groups of lines successively appear, till at the highest temperatures practically the whole spectrum of the neutral atom, and many of the more sensitive lines of the singly ionized atoms are in evidence. Dr. King's new method permits an extension of temperature classification far into the ultra violet.

Expects to Eliminate Hysteresis Losses

That electrical machinery to be built in years to come will be far more efficient than the best machines of the present day is the contention of Dr. T. D. Yensen, engineer in charge of the magnetic section, Westinghouse Electric & Mfg. Co., of East Pittsburgh, who will discuss the subject at the convention of the American Electrochemical Society, Hotel William Penn, Pittsburgh, Sept. 19 to 21. Starting out with iron electrolytically produced as a basis, Dr. Yensen further purifies this in an electric vacuum furnace and obtains a metal which analyzes almost 100 per cent pure iron. Dr. Yensen believes that hysteresis losses will eventually be entirely eliminated.

Standardization of Brass Pipe Nipples

Commercial standard C.S.10-29, of the United States Department of Commerce, deals with brass pipe nipples of three grades of brass, and covers both the iron pipe size and the extra strong size. Tables show standard weights and dimensions for the 17 sizes, from ⅛-in. iron pipe size to 10-in., which have been adopted as standard by the trade. Taper pipe thread dimensions are given and a list of stock sizes of standard weights, including both right-hand threads and left-hand threads.

This is part of the waste- elimination work which the Division of Simplified Practice has been carrying on.

Oxygen Regulator Has Double Diaphragm

Harris Calorific Co., Cleveland, has introduced an oxygen regulator which reduces the cylinder pressure to a pressure suitable for cutting and welding equipment in two stages. Two diaphragms are provided, each with its separate seat, properly proportioned of correct materials for the duty intended. It is claimed that this gives a much better control than a single-diaphragm regulator, where the one valve seat is depended upon for the dual purpose of holding the 2000-lb. cylinder pressure, and of regulating the flow to a torch needing anything from 1 lb. to 50 lb. pressure.

Conveyor Molding Unit Cuts Cost of Casting Babbitt Metal

ONE man can do in 19 min. what formerly took four men an hour in the casting of babbitt metal pigs in the plant of the Federal Mogul Corporation, Detroit, through the installation of the mold conveyor shown in the accompanying illustrations. The Federal Mogul Corporation, a large manufacturer of bearings, installed this equipment recently. Before the installation four molders were required; now one man does the same work in less than a third of the time.

The saving in wages amounts to $15 a day, and the mold conveying and casting unit takes half of the floor space that was used for the same work before the new installation was put in.

The equipment, which was provided by the Palmer-Bee Co., Detroit, consists of a reversible conveyor which carries the molds for the casting of the babbitt metal. A 2-hp. drive at 1200 r.p.m. operates the conveyor. The power unit includes Reeves variable speed transmission, which permits a travel of the conveyor belt ranging from 2 to 5 ft. a minute, as desired.

Placed alongside the melting furnaces, the molds on the conveyor belt can be filled by one operator, who pours from a dipper as shown in one of the illustrations. The pigs drop at either end of the conveyor into pits. With this equipment, 50,000 lb. of babbitt metal in 35-lb. pigs is cast in one day.

Not More Than a Minor Reaction Ahead

Business Not Yet Seriously Handicapped by Credit Stringency, But Possible Overreaching of Activity in Steel and Automobiles May Bring Recession

BY DR. CHARLES O. HARDY

THE record of the summer of 1929 will make cheerful reading for future students of the annals of American business. When the summer season opened, business and industry of almost every description were running at a high level; indeed to many a reaction seemed to be overdue. That the summer would bring at least the usual hot weather letdown seemed to be almost a certainty. Moreover, weather conditions turned out to be unusually trying.

Yet there has been little sign of the usual hot-weather recession, and the autumn opens with every indication of a continuance of such a high level of business activity as would have to be considered abnormal by the standards of a few years ago. Statistical barometers that reflect the condition of a wide variety of businesses, such as railroad car loadings, factory employment, payments through banks, consumption of electrical power and newspaper advertising, have all been running at high levels. Individual industries, notably iron and steel and automobile manufacture, have broken all records. Moreover, industries which have been backward during recent years, such as coal and certain textiles, have shown improvement.

Is such widespread activity in what is normally a dull season a favorable or unfavorable sign? Should we congratulate ourselves that the bugbear of summer inactivity has been vanquished, or should we apprehend that production is outrunning its market and setting the stage for the old spectacle of sudden business collapse, to be followed by a period of stagnation?

Production Matched by Consumption

In attempting to answer this question we may profitably consider several distinct sets of factors. First, what are the indications from the side of consumption and the state of inventories? On this side our data are very incomplete, but so far as they tell us anything they give no ground for alarm. Indexes of consumption indicate that in most lines the high level of productive activity is matched by a high level of consumer buying, and presumably of consumption. Department store sales are running at about the level of a year ago, while mail-order sales have increased by leaps and bounds. (The mail-order figures are, of course, swelled by the entry of prominent mail-order houses into the department store field, sales at their retail establishments being reported as mail-order and not as department store transactions.)

¶ Security market operations have not curtailed new financing, but have caused a shift from bonds to stocks.

¶ Industrial building, financed through the stock market, is active, contrasted with residential and public construction, which have been checked by the cost of long-time money.

¶ Interest cost of financing actual turnover of goods is of minor consequence, especially under hand-to-mouth buying.

¶ Inventories of middlemen not excessive, though there are indications of accumulated raw material stocks in hands of manufacturers.

¶ Transportation, productive capacity and labor supply show no symptoms of such strain as to portend business collapse.

Stocks of goods on hand reported by department stores and also by wholesalers indicate that there has been no dangerous piling up of goods in the hands of middlemen, though there is some evidence of an unusual accumulation of stocks of raw materials in the hands of manufacturers. Moreover, retail collections have been running better than a year ago, so that the expansion of retail trade appears to be on a sound financial basis.

Current Business Basis is Notably Favorable

A second line of inquiry as to the soundness of the current business program relates to the cost of doing business. Here also the indications, on the whole, are very favorable. In spite of the large volume of business there have not yet appeared the familiar symptoms of strain on the productive apparatus of society which have so often indicated the approach of business collapse. The most conspicuous illustration of the favorable situation in which business finds itself is afforded by transportation. In spite of a record-breaking volume of business, the railroads are maintaining the high record of efficiency and satisfactory service that has been characteristic of the past five or six years. Without marked expansion of the amount of rolling stock, the unprecedented volume of business is handled without complaints of car shortage or terminal congestion.

Likewise the labor situation gives, so far, no evidence that the pace of production is too rapid to be maintained. Until we begin to hear numerous reports of excessive overtime, strikes, rapid wage increases and complaints of diminished efficiency and a high rate of turnover, the labor situation must be adjudged favorable to continued prosperity.

High Money Not Hampering Turnover of Goods

A third point at which the stress and strain of excessive business activity has typically shown itself in the past is in the money market. Just as a boom which over-taxes the transportation facilities and the labor resources of the community inevitably undermines itself through pyramiding costs, so an attempt to expand business beyond the financial resources of the community may involve such pressure on the money market as to make its own continuance impossible. Here the case is now less favorable. Money rates by the standard of recent years are high, and show no signs of falling. Under the leadership of the New York call loan market, commercial paper rates, bond yields and acceptance rates have been advancing for nearly two years and now stand at the highest level since the crisis months of 1920-1921.

It does not appear, however, that business as yet has been seriously handicapped by a shortage of money. The experience of 1928 has gone far

to convince the thinking public that the influence of money rates on stock markets has, as a rule, in the past been greatly exaggerated by market analysts. The experience of 1929 is teaching the same lesson with regard to the influence of money rates on general business activity. What cramps business is not so much a difference of 1 per cent or 2 per cent in the price paid for short-time money as actual inability to get funds, and so far there has been little complaint that legitimate business has been handicapped by an actual shortage of credit.

With orders on the books, or with a firm market for products at profitable prices, the interest cost of financing the actual turnover of goods in manufacture or in wholesale trade has always been of minor consequence, and with the spread of hand-to-mouth buying it has become a less important element than ever before. It is in the speculative carrying of inventories beyond the normal needs of business that the price of money becomes a major factor, and all the available evidence indicates that the present business boom has been marked by a minimum of such speculative accumulation.

Credit Situation No Bar to Industrial Construction

The cost of long-time money is a more serious element in the business situation. The interest cost of the construction of a building, to be paid over a long term of years, cannot be ignored as readily as can the interest cost on a turnover of merchandise. Continued high rates for long-time capital can hardly fail to have a repressive influence on construction activities and a serious check to construction carries with it the threat of a genuine curtailment of business activity all along the line.

Building construction and permits (in spite of a bulge in July) have, for some months, been showing a downward trend, and this may well be a result of the relatively high cost of money. Two facts must be noted, however. First, rates have been high only for capital secured through bond issues; for firms that can secure their funds through stock issues the market has been and continues extremely favorable. The result of the extraordinary security market operations of the last year has been not a curtailment of new financing but a shift from bonds to stocks. This has handicapped those types of construction activity which cannot readily be financed through the stock market—such as residential building and public construction—but it has greatly stimulated industrial building activity. In the second place it must be noted that, while bond yields are high in comparison with stock yields and in comparison with the level of the past three years, they are no higher than they were in 1923 and 1924, when the post-depression building boom was in full swing.

No Business Depression in Prospect

Our conclusion is that in most lines of business the rapid tempo of the last six months has not produced such pressure on either the transportation equipment, the labor resources or the money markets of the country as to undermine seriously the capacity of well-managed industries to make satisfactory profits. This conclusion is confirmed both by the statistics of the failures and by the extremely favorable reports of corporation profits.

In summary, there seem to be no grounds for predicting the appearance of a major business reaction within the visible future. This is not to say, of course, that there are no lines of business in which production has run to excess and must be compensated for by a period of slackness. As Dr. Haney has pointed out in these columns in several recent articles, the indications are that steel production in the last few months has been much greater than seems to be required by the activity and prospects of the principal steel consuming industries. Likewise, there seems to be little prospect that the automobile industry can for an indefinite period find buyers for as many cars as it has been turning out in recent months. But such readjustments, at the worst, threaten a minor recession like that of 1927. They do not indicate the approach of a business depression.

Car Needs Expected to Gain in Last Quarter

An increase of 6.3 per cent in the number of freight cars required for the movement of iron and steel products in Pittsburgh and tributary districts in the fourth quarter of this year, as compared to the corresponding period of 1928, is predicted in the quarterly report of the Allegheny Regional Advisory Board. This figure is based upon replies to a questionnaire submitted by the board to shippers in western Pennsylvania, eastern Ohio, northern West Virginia and western Maryland and was formally announced at a meeting of the board in Canton, Ohio, on Sept. 12.

The estimate is particularly significant in view of the fact that the fourth quarter of last year was the best of the year in steel production. The figure does not include tin plate, on which a 0.4 per cent increase in car requirements is expected, or iron and steel scrap, on which a decrease of 1 per cent is looked for.

The large expected increase in steel shipments is partially explained by even heavier expansion in the car needs for commodities into the manufacture of which iron and steel enter in a large way. On agricultural implements and vehicles, the prospective increase in the last quarter over the corresponding 1928 period is 17.6 per cent; on castings, 26.4 per cent; on machinery, 11.5 per cent, and on electrical goods, 1.2 per cent. Decreases of 4.2 per cent on boilers and 5.1 per cent on sanitary ware are expected. Heavy increase in coal shipments is expected, the eastern Ohio region predicting a 51.4 per cent upturn in car requirements. An increase of 6.1 per cent in coke car requirements is also predicted.

DR. CHARLES O. HARDY of the Brookings Institution, Washington, will be a regular contributor to THE IRON AGE on the business situation. Born in Missouri in 1884 and educated in the public schools of Kansas and at Ottawa University, Ottawa, Kan., he took graduate work in history and economics, chiefly at the University of Chicago, where in 1916 he obtained the degree of Doctor of Philosophy. He was assistant professor of finance at that college from 1918 to 1922 and was professor of economics at the University of Iowa from 1922 to 1924. Dr. Hardy then joined the research staff of the Institute of Economics, now a subsidiary of the Brookings Institution. In 1927 he was joint author with G. U. Cox of "Forecasting Business Conditions." In 1925, in collaboration with R. N. Owens, he published "Interest Rates and Stock Speculation." He has contributed articles to *Annalist*, *New Republic*, *American Economic Review*, *Journal of Political Economy*, *Bulletin* of National Tax Association and *Proceedings* of American Statistical Association.

How Scrap Is Handled in Germany

Cooperative Methods in Vogue in That Country for 25 Years Said to Have Solved Many Problems

WITH uniform specifications for scrap iron and steel, with neutral inspection service on rejected cars, and with standard contracts, the steel mills and scrap iron dealers of Germany protect each other against the losses and the risks of the business and have found that over a period of 25 years cooperation is the best solution of their mutual problems. This was revealed in a conference in New York between Benjamin Schwartz, director general of the Institute of Scrap Iron & Steel, Inc., and Dr. Max Gerber, secretary of the Scrap Iron Association of Germany.

Mr. Schwartz has issued the following statement regarding the scrap purchasing methods in vogue in Germany:

"Doctor Gerber was commissioned by his organization to visit the American institute, to study the scrap iron situation in this country and to prepare a report for European organizations. It is expected that an exchange of information and facilities will be worked out between the American institute and the German association.

"The situation in Germany presents a sharp contrast to conditions in America, where each mill has its own specifications for scrap, every consumer determining for itself what are good shipments against its specifications, and where the competition among both consumers and dealers for scrap is unchecked, and in many cases unprofitable. In Germany, the steel mills and the scrap iron dealers each have their own organizations. The mills have created a central purchasing bureau and the dealers sell their scrap through a separate selling agency. The mills and dealers recognize each other's organization.

"The German mill men meet monthly, discuss their requirements for the month, and a quota is assigned to each mill for that period. Similarly, the dealers, through their organization, are given a quota of scrap, which they contract to deliver. The purchasing bureau of the mills buys the scrap and distributes it wherever it is needed, in accordance with the quotas assigned.

"The Iron and Steel Institute of Germany, representing the mills, publishes figures of scrap consumption, scrap produced at mills, stock on hand and market requirements, and both parties enter into contracts with full knowledge of the facts.

"All relations between dealers and mills are governed by a contract which has been running for the last three years. The dealers in turn have contracts with their selling agency. The contracts provide that the price for heavy melting steel is the standard and all other scrap commodities are on a fixed differential below heavy melting steel, the price for scrap, although fixed for every dealer, fluctuates in accordance with supply and demand. The price to every dealer is f.o.b. Essen, in West Germany, minus the freight from Essen to the point of shipment.

"The contract further provides for an accounting to the mills and dealers once a month. The mills are charged the average price of scrap shipped from all sources, plus the average freight, plus a share of the expenses of the purchasing bureau. The dealers are paid three times a month, or within 30 days. This plan has been found satisfactory in solving the problems of the scrap iron industry in Germany, after 25 years of organization and experience.

"Except for the war period, when the Government had an official commission to regulate the price and distribution of scrap, the mills and the dealers have been cooperating during this period to assure their supply and to eliminate the losses and risks of the business. The scope of the business, under the uniform contract, can be seen from the fact that the selling agency for the scrap iron dealers employs approximately 200 persons, while the purchasing agency of the mills employs approximately 60. The total consumption of scrap by the German steel industry amounts to approximately 7,500,000 tons annually, of which 3,500,000 tons is purchased in the open market, the balance being 'home' scrap."

Gulf States Steel Co. to Roll Coninuous Sheets

Gulf States Steel Co. has been granted a license for the construction of a sheet mill using the American Rolling Mill Co. continuous process. Plans for new plant capacity at Alabama City, Ala., which call for four to six hot mills, are now being revised. Preliminary work on the building of blooming and plate mills has begun.

$35 a Share Offered For Donner Common Stock

The Marine Trust Co. of Buffalo, acting as agent for the purchase of shares of common stock of the Donner Steel Co., Buffalo, has announced that it is prepared to purchase at $35 a share all or any part of the outstanding shares of common stock which may be tendered at its trust department, 237 Main Street, Buffalo, on or before the close of business Sept. 27, 1929.

This offer is accompanied by the following statement under the signature of William H. Donner, president of the company:

"During the past summer negotiations were undertaken for the sale of a substantial block controlled by my interests of outstanding common stock of Donner Steel Co., Inc. These negotiations resulted in an agreement for the sale of the said stock at $35 a share. One of the conditions of the sale required the purchaser to offer to purchase the remaining outstanding shares of common stock of the company at the same price. The inclosed offer of the Marine Trust Co. of Buffalo, acting as agent on behalf of the purchaser, dated Sept. 13, 1929, is made in accordance with that agreement."

The foregoing is the only formal statement that has been made by the Donner interests so far in the development of negotiations by which controlling interest of this plant was transferred to Cyrus S. Eaton of Cleveland.

Starts Movement for Tax Reduction

A movement has been launched by the Illinois Manufacturers Association to obtain a reduction of the Federal corporation income tax from 12 to 10 per cent. A resolution urging such action has been adopted and copies will be sent to members of Congress. It declares that this action would stimulate industrial activity and furnish additional employment at a time when most needed and increase corporation earnings so that individual gains would be available for personal income taxes.

Allis-Chalmers Mfg. Co. May Buy Plow Works

Complete purchase of the La Crosse Plow Works, La Crosse, Wis., by the Allis-Chalmers Mfg. Co., Milwaukee, is expected to be completed at a reported cash price of approximately $1,000,000 before the end of September, according to recent announcements. The La Crosse plant, it is also announced, will be enlarged and production stepped up to an annual sales volume of about $1,000,000, as against the present total of about $600,000 annually.

Negotiations for the deal have been going on for the last four weeks. The Allis-Chalmers Mfg. Co. had determined that the acquisition of the La Crosse plant would fit in with its program of tractor development in which the United Tractor & Equipment Co. has served as a sales medium.

Officials of the Allis-Chalmers Co., while conceding the correctness of reports regarding the purchase of the La Crosse plant, refused to confirm or deny other reports that the plant of the Falk Co., Milwaukee, manufacturer of gears, speed reducers and Diesel engines, was to be absorbed.

The La Crosse concern makes plows, harrows, disks, drills and cultivators. It was founded in 1898 and its plant comprises 10 factory buildings, with about eight acres of floor space.

Gray Iron Castings Listed for More Than 2000 Uses

More than 2000 uses of gray iron castings are listed in a book issued by the Gray Iron Institute and distributed among the members. The publication is expected to be helpful to foundrymen in checking the outlet for their products and expanding uses for castings.

A. J. Tuscany, manager of the institute, announces that arrangements have been completed for presenting, to users of castings and others interested, information on the proper uses as well as properties of gray iron for different conditions. One phase of this educational work will consist of addresses before groups of manufacturers, engineering societies, technical bodies and other organizations. Prominent metallurgists will work with the institute in this activity.

Committees of various organizations desirous of having addresses on gray iron presented to their groups are invited to communicate with the institute, Terminal Tower Building, Cleveland, and speakers will be made available who have had particular experience along the line of each organization's special interest.

Shortens Annealing Time in Malleableizing

A new short-cycle annealing process for the production of malleable iron castings is announced by the General Electric Co. A number of advantages have resulted from the use of the new malleableizing process, particularly a saving of many days.

Details of the new method were worked out in the Erie foundry of the General Electric Co. Three electric annealing furnaces are used for this purpose at the Erie plant, each rated 325 kw. and using nickel-chromium ribbon resistor heating elements. The connections are arranged to allow a power input of 52, 170 or 325 kw. as desired. The capacity of the installation is 100 tons of castings per week.

In operation the hard castings, of commercial composition, are packed on the car bottoms or without iron plates or boxes, depending on the nature of the load. It was found that best results were obtained by stacking the charge directly on the floor of the car.

The charge is then placed in a furnace and heated to a sufficiently high temperature to effect solid solution of free cementite, whereupon the charge is transferred without removing from the car, to another furnace for cooling. In this furnace the castings are brought to a temperature below 750 deg. C., which is held for approximately 4 hr., after which the temperature is suddenly lowered a few degrees and maintained at this lower temperature for another 4 hr., when this step is repeated. The castings are then transferred either to a cooling furnace or into the air, or they may be quenched immediately with increased strength and without brittleness. The average time for a 6-ton anneal is between 28 and 30 hr.

Tests taken by the General Electric Co. show that the tensile strength, yield point and other characteristics are practically the same with the short-cycle anneal as with the older methods. It was found that the short-cycle malleable iron machines better than the long-cycle product, and shows no signs of framing or reversion. Very little skin is found and the castings clean somewhat easier than the old type of product. The castings may be galvanized without embrittlement and without previous or subsequent treatments. Warpage is also found to be reduced.

Shipments Through Sault Ste. Marie Canals

Iron ore passing east-bound through the United States canal at Sault Ste. Marie, Mich., in August totaled 10,547,401 net tons. Pig iron passing through east-bound totaled 5627 net tons, while the Canadian canal carried an additional 4876 tons of pig iron. Iron ore passing west-bound through the American canal amounted to 14,560 tons. Manufactured iron and steel moving west-bound was 7477 net tons through the American canal and 7448 tons through the Canadian canal.

The iron ore moving east-bound constituted almost 94 per cent of the total east-bound freight through the American canal and about 92 per cent of the total east-bound freight through both canals. The Canadian canal passed less than 3 per cent of the total freight, but 55 per cent of the number of passengers.

Chemical Show in Germany in 1930

The sixth general exhibition of the German chemical industry (*Achema*) will be held at Frankfort-on-Main June 10 to 22, 1930. The show will occupy 20,000 sq. m. (215,200 sq. ft.) of floor space, as compared with 562 sq. m. (6047 sq. ft.) in the first exhibition, which was held in 1920 at Hanover. Fully one-half of the space at Frankfort has already been taken by German companies, and English and American manufacturers are also expected to participate in the exposition. Corrosion resistant materials developed for chemical purposes will be among the features of the exhibits.

Concurrently with the show the following organizations will hold meetings: the Association of German Chemists, the Combustion Society, the Associated German Equipment Builders' Societies, the German Society for the Chemical Equipment Industry, the German Rubber Association, the Association of Rubber Chemists and Engineers. Full particulars regarding the exhibition may be obtained from the Deutsche Gesellschaft für chemisches Apparatewesen, Seelze, near Hanover, Germany.

Aluminum Production Increasing

All indications seem to show that the world's production of aluminum is steadily increasing, according to C. L. Mantell, writing for "Mineral Industry, 1928." The last year has witnessed the opening of several new plants, as well as extensions and enlargements of older ones. It is difficult to state how much of the world's production is controlled by the Aluminum Co. of America and Aluminium Ltd., and how much by the organizations affiliated with the Cartel. It is believed, however, that the first group now controls more than half of the production of the world.

The value of new aluminum produced in 1928 in the United States was $47,899,000, an increase of 22 per cent as compared with 1927. As in previous years, the principal producing plant was the Massena, N. Y., works, the remainder coming from Niagara Falls, Alcoa, Tenn., and Badin, N. C. No new production capacity was under construction in the United States in 1928, although there had been considerable extension of fabricating facilities, particularly for sheets and strong alloys.

The secondary production is becoming of greater and greater importance. It is now the usual thing that for every two pounds of virgin metal production somewhat more than a pound finds its way back as scrap for reworking as remelt aluminum or its alloys. The secondary-metal business has been constantly developing in its technology, and raising the quality standards of its products.

Imports of metal during 1928 markedly decreased, from 68,389,641 lb. in 1927 to 37,895,832 lb. in 1928. As in previous years, the metal imported is chiefly ingot, scrap or alloy. The exports of aluminum show a considerable increase, particularly in fabricated products such as plate. The total amounted to 16,732,238 lb., valued at $6,891,490.

Philadelphia Meeting Will Cover Industrial Heating

Included among the papers scheduled for the third national fuels meeting of the American Society of Mechanical Engineers are the following on industrial heating:

"Economics of Industrial Heating Practice," by J. A. Doyle, vice-president, W. R. Rockwell Co., New York.

"Electricity for Industrial Heating Furnaces," by W. S. Scott.

"Gas for Industrial Heating Furnaces," by H. O. Loebell.

"Oil for Industrial Heating Furnaces," by Leod D. Becker.

Arrangements are being made for a meeting of unusual size and of prime importance. The dates are Oct. 7 to 10, inclusive, and the place, Philadelphia, at the Bellevue-Stratford Hotel. Besides the industrial sessions, there will be meetings for stoker, power plant, smoke abatement and domestic heating topics.

To Head Bureau of Foreign and Domestic Commerce

WASHINGTON, Sept. 17.—The name of William L. Cooper, commercial attaché at London, was sent to the Senate yesterday by President Hoover to be director of the Bureau of Foreign and Domestic Commerce, Department of Commerce, to succeed Dr. Julius Klein, who has been made Assistant Secretary of Commerce.

Mr. Cooper, born in Saginaw, Mich., in 1878, is a graduate mechanical engineer from the University of Michigan. In 1901 he was associated with Robert W. Hunt & Co., Chicago, as assistant mechanical engineer, with headquarters in London. From 1902 to 1917 he was European manager and principal engineer for that company, with headquarters in London. In the latter year he established his own offices in New York, serving as engineer and purchasing agent for clients in foreign countries. He reorganized the technical inspection of the supply division of the Emergency Fleet Corporation in 1918 for one of its districts and later was made district manager.

He formed a partnership in 1919 with R. D. McCarter, and was engaged as consulting engineer, purchasing and shipping agent in America for clients abroad. In 1926 he was appointed commercial attaché, London.

Lower Earnings in New York Factories

Average weekly earnings in representative factories in New York State are reported by the State Industrial Commissioner to have been $29.80 in July. This is the lowest figure since last January. It compares with $30.02 in June, with $30.35 in March, the highest peak ever reached, and with $29.15 in July, 1928.

Making Rustless Iron Wire, Sheets and Strips

The Superior Steel Corporation, Pittsburgh, which, as mentioned in THE IRON AGE last week, has been appointed sales agent for the Rustless Iron Corporation of America, Baltimore, is also now in production on cold rolled strip steel made from ingots supplied by the Rustless Iron Company. The American Sheet & Tin Plate Co., Pittsburgh, is also utilizing the Baltimore company's rustless iron for the rolling of sheets, and it is reported that the Copperweld Steel Co., Glassport, Pa., will soon begin the manufacture of cold drawn wire from the product.

The Rustless Iron Corporation is the operating subsidiary in this country of the International Rustless Iron Corporation, and produces at its Baltimore plant rustless iron under a process covered by the Wild patents, which are owned by the International company. These patents use chrome ore as a base material.

Two grades of rustless iron are now being made. The company contemplates the building of a larger electric furnaces at Baltimore, and it is reported that a plant location in the Pittsburgh district is being sought.

James A. Campbell Honored on 75th Birthday

JAMES A. CAMPBELL, president of the Youngstown Sheet & Tube Co., celebrated his seventy-fifth birthday by entertaining a group of friends in the steel industry over the week-end at his home, Loganbrook, north of Youngstown. Included in the group were Charles M. Schwab, chairman, and Eugene G. Grace, president, of

JAMES A. CAMPBELL

the Bethlehem Steel Corporation; Samuel Mather, John L. Severance, H. G. Dalton, Harris Creech, John Chandler, Elton Hoyt II, and J. P. Williams, Cleveland; E. A. S. Clarke, Arthur J. Singer and L. J. Campbell, New York; C. D. Caldwell and E. H. Stillman, Chicago; and from Youngstown, A. E. Adams, John W. Ford, T. J. Bray, Richard Garlick, William B. Gillies, E. T. McCleary, L. A. Manchester, Walter E. Meub, W. J. Morris, Frank Purnell, W. C. Reilly, C. S. Robinson, John Tod, W. E. Watson and R. M. Welch.

Wednesday evening, Sept. 11, the date of his birthday, Mr. Campbell was tendered a testimonial dinner at the Ohio Hotel in Youngstown, attended by 400 representative citizens of the Mahoning Valley. A. E. Adams, president, First National Bank, and a director of the Sheet & Tube company, presided. Addresses were delivered by Mayor Joseph L. Heffernan, Dr. I. E. Philo, John T. Harrington, E. T. McCleary and L. A. Manchester.

At the conclusion of the program, Mr. Adams read a testimonial, applauding President Campbell's achievements and his untiring efforts in behalf of Youngstown. The latter responded briefly.

President Hoover sent to Mr. Campbell the following telegram:

"Permit me to join with your other friends in extending to you heartiest congratulations upon your seventy-fifth birthday."

At 75, President Campbell, apparently in the prime of life, has no thought of retiring and intends to "carry on" so long as his health permits. He is at his office virtually every day except when he is in New York on business, and keeps in active touch with all the affairs of his corporation.

United States Uses 41 Per Cent of World's Tin

During 1928 the United States consumed 73,270 tons of virgin or primary tin, representing 41 per cent of the world's production of approximately 178,000 tons, according to a report of the United States Bureau of Mines. The consumption for tin plate and terne plate manufacture, accounting for 37 per cent of the total, represents the principal single use for tin in this country. Last year the tonnage for this purpose showed a gain of 10 per cent over the previous year, the increase having been caused by general industrial expansion and by larger manufacture of canned goods. The growing practice of lap-welding and die stamping tin cans has lessened the demand for solder in canning operations and consequently for much tin. Further data in regard to this subject are contained in circular 6165, "Consumption of Tin in the United States During 1928," published by the United States Bureau of Mines, Department of Commerce, Washington.

Diamond Chain & Manufacturing Co., Indianapolis, has completed a four-story office and administration building, the two lower floors of which will be used for manufacturing purposes. The space formerly occupied by the office, engineering and drafting departments has been converted into a manufacturing department. A new one and a half story addition is being used for steel storage. These changes have added 40,000 sq. ft. to existing manufacturing space.

Inland Steel Co. has painted an airport marker on the roof of its Milwaukee plant, carrying the name "Milwaukee" in high visibility yellow paint on black background. The sign is 80 ft. long, 20 ft. wide and will be lighted at night. An arrow, 60 x 20 ft., yellow on black background, points southeast toward the municipal airport.

Oil Transfer Corporation, 17 Battery Place, New York, has placed a contract with Ingersoll-Rand Co. for an 800-hp. direct reversible marine oil engine for installation in its new tugboat which is being built by the Spedden Shipbuilding Co.

Metal Supplants Wood in New Cabin Plane

The tendency to supplant wood with metal in the manufacture of airplanes is indicated in a statement of engineers of the Ryan Aircraft Corporation, St. Louis, that only 298 lb. of wood is used in the new six-place Ryan Brougham cabin plane. This includes all the wood used in the construction of the wing, fuselage, fairing and other parts. The ship weighs 2250 lb., less gasoline, oil, passengers and pilot. Thus in this plane only 17 per cent of the entire construction is of wood, and, with the exception of the wing, there is no strain on any of the wood parts.

"This tendency to eliminate wood from airplane construction has resulted in much safer, stronger and lighter construction," the engineers state. In a Ryan plane the pilot and passengers are now surrounded by a steel tubing structure which protects them from injury, even in a crash.

Steel propellers have been substituted for the old wooden ones. Instrument boards are made of micarta, cabin frame work is largely of aluminum, and wood is used only for the wings, fairing and as a frame work for upholstering the cabin.

August Construction 25 Per Cent Less Than July

Construction contracts awarded in August in the 37 States east of the Rocky Mountains totaled $488,882,400, according to the F. W. Dodge Corporation. This represents a drop of about 25 per cent from July and is 5 per cent lower than in August, 1928. Only two of the eight districts show increases over July. In contemplated new work, however, seven of the eight districts show increases, the total having been $657,832,000, or 37 per cent more than in July.

Residential building contracts continue to lead, but with a considerably lower percentage of the total than has prevailed for several years. In August this type of construction accounted for $146,088,200, or 30 per cent of all, compared with 35 to 40 per cent or more, which has prevailed monthly for a long period. Public works and utilities in August accounted for $119,287,800, or 24 per cent. Industrial buildings called for $75,265,000; commercial buildings, $71,955,400; educational buildings, $32,349,400.

Totals for eight months have aggregated $4,156,865,000, compared with $4,545,270,000 for the corresponding period of last year.

Peden Iron & Steel Co. Buys Wilson Hardware Co.

The Peden Iron & Steel Co., Houston, Tex., wholesale hardware and mill supplies, has purchased the E. L. Wilson Hardware Co., Beaumont, Tex., engaged in a similar line of business. E. G. Edson, formerly president and general manager of the Wilson company, and Virgil Keith, a former vice-president, whose father for 25 years was president of the Wilson company, have been added to the board of directors of the Peden company and will continue in active capacities with the organization. The stores of the Wilson company will be continued.

New Laclede Tube Mill to Be Ready in January

Standard merchant pipe from ⅜ in. to 4 in. in diameter and mechanical tubing and electrical conduit, both enameled and galvanized, will be manufactured in the tube mill of the Laclede Steel Co., St. Louis, being erected at Alton, Ill. This mill, which is the first pipe plant in the St. Louis district, will begin production in January and will employ over 200 men. Complete finishing equipment for galvanizing will be a feature of the plant.

Link-Belt Co., Chicago, has appointed the following district sales agents for its line of cranes, shovels and draglines: James Van Buskirk, 911 Martin Building, Birmingham, for Alabama; Clyde Co., 309 Magazine Street, New Orleans, for Louisiana and most of southern Mississippi; Holloran Tractor Co., 188 Butler Street, Memphis, Tenn.; Ensminger & Co., 181 South Washington Street, Wilkes-Barre, Pa.; United Hoisting Co., 136th and Locust Streets, New York; Charles L. Miller, Denver and Salt Lake City.

Employment and Payroll Totals in Identical Plants in July and June (a)

	Establishments	Number on Payroll		Weekly Payroll (b)	
		July	June	July	June
Iron and steel	208	285,362	287,502	$8,867	$9,440
Foundry and machine shop	1,054	284,932	285,539	8,579	8,876
Machine tools	147	41,150	40,878	1,322	1,358
Hardware makers	76	32,148	32,576	796	853
Steam and hot-water appliances	108	30,225	31,768	859	927
Stoves	114	18,618	20,017	508	562
Structural ironwork	175	29,984	29,414	886	889
Cast iron pipe	43	12,767	12,477	306	293
Automobiles	228	455,682	466,670	13,247	15,739

(a) United States Bureau of Labor Statistics.
(b) Thousands of dollars.

Aircraft Makers Bought by Allied Motor Industries

Allied Motor Industries, Inc., operating American Cirrus Engines, Inc., Belleville, N. J., maker of aircraft motors, and the Great Lakes Aircraft Corporation, Cleveland, manufacturer of airplanes and parts, has acquired a controlling interest in the American Aeronautical Corporation, 730 Fifth Avenue, New York, maker of seaplanes and amphibians of the Savoia-Marchetti type.

The last-named company has a plant at Whitestone, L. I., but will soon transfer its operations to Port Washington, L. I., where it is now constructing a factory. One section of the building is nearing completion and the entire plant, of U-shape, will have 24,000 sq. ft. of floor space, and will cost $100,000 with equipment. The main floor will be devoted to manufacturing, while a second floor will be used for classrooms for a seaplane school. A seaplane terminal is also being built.

Foundrymen's Board Holds Annual Meeting

The annual meeting of the board of directors of the American Foundrymen's Association was held at the Hotel Statler, Cleveland, Sept. 12, and the new officers elected at the Chicago convention were installed. These are: President, Fred Erb, president, Erb-Joyce Foundry Co., Detroit; vice-president, N. K. B. Patch, secretary, Lumen Bearing Co., Buffalo; directors: F. J. Lanahan, president, Fort Pitt Malleable Iron Co., Pittsburgh; Harold F. Falk, vice-president and works manager the Falk Corporation, Milwaukee; Arnold Lenz, manager of the Gray Iron Foundry of the Chevrolet Motor Co., Saginaw, Mich., and Delos H. Wray, Henry Wray & Son, Inc., Rochester, N. Y.

Plans were made for the next annual convention and exhibition, which will be held in Cleveland, May 12-16. It was decided to have as an added feature of the exhibit a large technical and educational exhibit.

138 Steel Ships Under Way

WASHINGTON, Sept. 17.—On Aug. 1, American shipyards were building or under contract to build for private owners 138 steel vessels of 141,552 gross tons, as compared with 174 steel vessels of 150,782 tons on July 1, according to the Bureau of Navigation, Department of Commerce.

More than 300,000 commercial users of tin and copper are now in business in the United States, according to a preliminary survey by the National Metal Exchange. This figure includes only individuals or corporations fabricating or purchasing articles made of these metals in sufficient quantities to be materially affected by price fluctuations.

Little Movement in European Markets

High Production Costs for British Pig Iron—German Steel Plants Use Much Power—Japan to Expand Rolling Mills

(*By Cable*)

LONDON, ENGLAND, Sept. 16.

INCREASED production costs are hampering expansion of pig iron output and Cleveland makers are generally sold out to the end of October. Most of this business is for domestic delivery, as export buyers are unwilling to pay the advanced prices.

Hematite iron prices are gradually rising, but as a higher market will jeopardize increased export business it is believed that some furnaces may suspend.

Finished steel business is generally quiet, but inquiries are in moderate volume. Most mills rolling light weight material are well occupied, but plate mills are still in need of orders, especially for shipbuilding.

British exports in August were 38,000 tons of pig iron, of which the United States received 3000 tons. Total iron and steel exports were 358,000 tons.

British consumers of Continental sheet bars have bought heavily of late, but otherwise the market is quiet with transactions delayed until after the Cartel meeting. Tin plate prices are strong as a result of good buying and 18s. 7½d. ($4.51) per base box f.o.b. works port has been paid, with 19s. ($4.60) per base box now asked by mills which are well engaged. Works are well sold up to the end of the year and recent inquiries are for delivery into the first quarter.

Galvanized sheets are quiet but prices are steady, although Indian demand has not improved. Black sheet business is dull and mills rolling Japanese light gage specifications have reduced prices.

Ashmore, Benson, Pease & Co., Stockton-on-Tees, will build a blast furnace with a weekly capacity of 3500 tons of pig iron for the new Ford works at Dagenham. The new furnace will be the largest in the United Kingdom. The Albion Motor Co., Glasgow, has secured a £200,000 ($970,000) contract for 190 6-wheel motor cars from the Indian Government.

German Contracts Omit "Force Majeur" Clause

HAMBURG, GERMANY, Sept. 3.—A feature of the steel market is the willingness of domestic and export buyers to pay premiums of 1s. 6d. to 2s. 6d. (36c. to 60c.) a ton for prompt shipment. This has been due to the fact that sellers are now guaranteeing compensation to the buyer for delays and are waiving the "force majeur" clause in their contracts. Omission of the "force majeur" clause is unusual, and Belgian and Luxemburg steel mills, in most cases, have been disinclined to take such action. Consequently, German sellers have been booking a considerable tonnage for delivery in 25 to 26 days after acceptance of the order. Business on this basis has included bars, beams, and other heavy material.

Japanese Rails May Go to American Mills

NEW YORK, Sept. 17.—Exporters to Japan have been obtaining bids from American mills on about 10 miles of 75 and 100-lb. rails for the Nankai Electric Railroad. Although these sections are obtainable in Japan from the Government Steel Works, which has a large capacity for rail production, exporters believe that the early shipment specified by the railroad may bring the order to the United States, as deliveries from both the Japanese and the European mills are delayed.

Bids received by the Nippon Oil Co. in Japan on its recent inquiry for about 50,000 base boxes of oil sizes of tin plate were unsatisfactory and, as the material was for next year's requirements, purchase has been postponed. On its previous quarterly purchase of tin plate, quotations by British mills were low and American bids were high, so that the order went to the British. On the

British and Continental European Export prices per gross ton, f.o.b. United Kingdom Ports, Hamburg and Antwerp with the £ at $4.85

British Prices, f.o.b. United Kingdom Ports

Cleveland No. 3 foundry	£3	12½s.	to	£3	13½s.	$17.58	to	$17.82
East Coast Hematite	3	16	to	3	16½	18.39	to	18.51
Ferromanganese, export	13	10	to	14	0	65.47	to	67.90
Billets, open-hearth	6	7½	to	6	10	30.92	to	31.52
Sheet bars, open-hearth	6	5	to	6	10	30.31	to	31.52
Black sheets, Japanese specifications	12	17½				62.31		
Tin plate, per base box	0	18⅝	to	0	19	4.51	to	4.60
Rails, 60 lb. and heavier	7	15	to	8	15	37.59	to	42.43
						Cents per Lb.		
Steel bars, open-hearth	7	15	to	8	10	1.67	to	1.84
Beams, open-hearth	7	2½	to	7	12½	1.55	to	1.65
Channels, open-hearth	7	7½	to	7	17½	1.60	to	1.71
Angles, open-hearth	8	2½	to	8	12½	1.76	to	1.86
Ship plates, open-hearth	7	12½	to	8	2½	1.66	to	1.76
Black sheets, No. 24 gage	10	5	to	10	10	2.21	to	2.27
Galvanized sheets, No. 24 gage	13	7½	to	13	10	2.89	to	2.92

Continental Prices, f.o.b. Antwerp or Hamburg

Foundry iron, 2.50 to 3.00 per cent sil., 0.50 to 0.90 per cent phos.	£3	7s.	to	£3	10½s.	$16.24	to	$17.09
Foundry iron, 2.50 to 3.00 per cent sil. 1.00 per cent and more phos.	3	10				16.97		
Billets, Thomas	4	14	to	4	14½	22.79	to	22.91
Sheet bars, Thomas	4	16	to	4	18	23.28	to	23.76
Wire rods low C., No. 5 B.W.G.	6	5	to	6	6¼	30.30	to	30.61
Black sheets, No. 31 gage, Japanese	12	7½				60.02		
Rails, 60 lb and heavier	6	10*				31.52		
Rails, light	6	1½				29.46		
						Cents per Lb.		
Steel bars, merchant	5	10½	to	5	11	1.19	to	1.20
Steel bars, deformed	5	10	to	5	11	1.19	to	1.20
Beams, Thomas, British standard	5	2	to	5	6½	1.12	to	1.17
Channels, Thomas, American sections	5	14	to	5	18	1.24	to	1.27
Angles, Thomas, 4-in. and larger, over ⅜-in. thick	5	5				1.14		
Angles, Thomas, 3-in.	5	13				1.22		
Ship plates, open-hearth inspected	7	8				1.63		
Hoop and strip steel over 6-in. base	5	15	to	5	16	1.24	to	1.27
Wire, plain, No. 8 gage	7	5				1.57		
Wire, galvanized, No. 8 gage	9	5				2.00		
Wire, barbed, 4-pt. No. 12 B.W.G.	11	12½				2.58		
Wire nails, base	7	10½				$1.63 per keg		
Wire nails, assortments, 1 to 6-in., keg	10	6½				2.23		

*Open-hearth steel, 10s. ($2.42) per ton extra.

recent inquiry the positions of American and Welsh mills were reversed, mills in the United States being the low bidders for the business.

To Make Concrete Products from Slag

DUSSELDORF, GERMANY, Sept. 2.—The Vereinigte Stahlwerke A. G. is constructing a plant near Duisburg, which will use blast furnace slag in the production of concrete paving stones, brick and pipe. It is to be the largest plant of its kind in Germany, with a capacity of 1500 to 1700 tons. Most of the output will go to Dutch contractors.

German Steel Industry Leads in Power

HAMBURG, GERMANY, Sept. 3.—An investigation of horsepower per employee used in German, British and American industries made by the Reichscreditgesellschaft, Berlin, and the German Business Research Institute, shows Germany leading slightly in the iron and steel plants and in coal mining. In blast furnaces and steel mills the per capita use in 1928 was 17.5 hp. in the United States, 18.7 in Germany and 11.1 in Great Britain. In coal mining per capita horsepower was 4.9 in the United States, 7.7 in Germany and 5.4 in Great Britain.

In shipbuilding, however, Germany lagged with only 3.4 hp. per capita, compared with 3.9 per capita in Great Britain and 6.2 in the United States. In the automobile industry per capita use was 2.8 hp. in the United States, 1.4 in Germany and 1.3 in Great Britain. In the investigation, all plants employing 50 or more men were included.

Japan to Expand Mills

HAMBURG, GERMANY, Sept. 3.—Machinery builders are negotiating for some substantial contracts with Japanese steel mills, which are planning increased production of wire rods, sheets and plates. Representatives of the Japanese works have arrived in Germany to inspect German equipment, and a large share of the business is expected to be placed here.

Oppose Copper Rebate

HAMBURG, GERMANY, Sept. 3.—Copper smelters have requested the railroads to consider gradual abolition of the special freight rates from ports on imports of copper, pointing out that German production during the next year will be considerably increased. At present a refund of 40 per cent of the freight rate is granted to large copper consumers.

Bethlehem Steel Co. has purchased from H. A. Brassert & Co., Chicago, three disintegrators for the fine cleaning of blast furnace gas.

Manganese Producers Say 1½c. Duty Is Essential

WASHINGTON, Sept. 17. — The American Manganese Producers' Association at its second annual convention here last week adopted a resolution "that a tariff of 1½c. a lb. on the metallic manganese content of all ores containing more than 25 per cent manganese with protection for low grade ores is absolutely essential and nothing less will provide adequate protection for the domestic industry. The association stands solidly behind the tariff provisions as contained in Senator Oddie's amendment."

The Oddie amendment provides for a duty of ½c. a lb. on the manganese contained in ores running from 10 to 20 per cent manganese, 1c. a lb. on ores running from 20 to 25 per cent, and 1½c. a lb. on ores containing manganese in excess of 25 per cent, ores containing less than 10 per cent remaining on the free list.

New Mileage Freight Rates Postponed to Dec. 20

WASHINGTON, Sept. 17.—An order made public last Thursday by the Interstate Commerce Commission postponing from Oct. 20 to Dec. 20 the effective date of the general Eastern steel rate case decision has aroused interest as to whether the proceeding will be reopened for further consideration. The order provides, however, only for postponement of the effective date. At the same time it is recalled that reopening and reargument were requested of the commission not only by the railroads but by a number of shipper organizations.

The railroads, as pointed out in THE IRON AGE of Aug. 29, page 553, particularly objected to the so-called fourth section (long-and-short-haul) order in the decision and declared that they could not publish any mileage scale of rates, which were set up in the decision, without having adequate fourth section relief. Because of this situation agents for the railroads said they were preparing a new fourth section application "in order to make the relief adaptable to and consistent with the distance scales."

Among shipper organizations asking for a postponement of the effective date and a rehearing of the case were those in northern New Jersey cities. Removal of these points from the New York City rate group on traffic afforded rail service only was sought. The Port of New York also asked for reopening of the case in order that a number of points might be "cleared up."

The decision covered all rates on manufactured iron and steel products throughout Official Classification territory. It follows a prolonged investigation under the Hoch-Smith resolution and was the most sweeping iron and steel rate case ever passed upon by the commission.

New Steel Plant Safety Record Made by Armco

A new safety record for a steel plant is thought to have been established by the East works of the Middletown, Ohio, division of the American Rolling Mill Co. when it completed at midnight, Sept. 8, 1,158,000 man-hours without a lost-time accident. This is equivalent to 45 consecutive days for over 3700 men. The new record supplants that made on June 29 by the Butler, Pa., works of the Columbia division of Armco, which had finished 66 consecutive days, but only 1,006,135 man-hours, without a lost-time accident.

Aluminum Plant in Hungary

HAMBURG, GERMANY, Sept. 3.—The interests controlling most of the Continental bauxite deposits are preparing to establish an aluminum plant near Budapest, Hungary, with a capacity of about 1500 tons a year. This will be the first aluminum plant in Hungary, which heretofore has imported its requirements of about 2000 tons of aluminum annually from Switzerland and Germany.

Production and Shipment of Raw Materials and Finished Products

	August, 1929	July, 1929	August, 1928
Trackwork for T-rail track (a) net tons...	14,818	13,844	11,040
Trackwork for T-rail track, first 8 months...	114,099	.....	99,945
Portland cement, production (b) bbl. (c)....	18,594(d)	17,281	18,759
Portland cement, production first 8 months...	110,951	.....	113,294
Portland cement, shipments (b) bbl. (c).....	23,019(e)	20,295	21,970
Portland cement, shipments, first 8 months...	113,562	.....	115,824
Portland cement, stocks, end of month.....	20,101	7,525	19,374
Mechanical stokers sold, hp. (f).....	54,929	65,197	51,572
Mechanical stokers sold, first 8 months....	413,347	.....	336,259
Sheet-metal ware (f):	July, 1929	June, 1929	July, 1928
Galvanized, shipments, dozens.....	153,958	140,096	169,271
Galvanized, value.....	$628,545	$609,487	$677,451
Enameled, shipments, dozens.....	291,332	337,375	277,684
Enameled, value.....	$1,097,956	$1,210,568	$1,058,547

(a) American Iron and Steel Institute.
(b) United States Bureau of Mines.
(c) Thousands.
(d) Largest since August, 1928.
(e) Largest volume ever reached.
(f) United States Department of Commerce.

This Issue in Brief

Multiple drill set-up time reduced more than two-thirds by use of cluster plates. Screw bushings in the holes in plates permit the tools to be set accurately for depth.—Page 728.

* * *

Machinability of "short-cycle" malleable iron is better than that of "long-cycle" product, says maker of new equipment. The 28 to 30-hr. anneal is said to produce a casting with very little skin and with reduced warpage. —Page 776.

* * *

High level of business activity to continue, economist judges from indications. No signs yet that high money rates have handicapped business.—Page 774.

* * * *

Butt welds thin sheets automatically with a joint 85 per cent efficient. Insulated conductor loop, placed close up under copper backing bar, counteracts the "blow" caused by clamps and backing bar.—Page 742.

* * *

Nitriding in molten salts cuts nitriding time sharply, say metallurgists. Very satisfactory results are claimed, with a case of 0.005 in. obtained in one to two hours. Case is said to be three times as hard as that by ammonia hardening.—Page 740.

* * *

Tests coupons cut from welds in the field. Portable testing machine contains a hand-operated hydraulic pump, which subjects the weld to a tension test.—Page 741.

* * *

All steels have same torsional strength at 900 deg. C., tests reveal. But the angles of twist, in novel test conducted by engineer, vary widely and unaccountably.—Page 734.

Cadmium demand rapidly increasing. Growth in consumption of cadmium for plating, solders and alloying has greatly increased production. Practically all cadmium comes from treatment of impure zinc solutions used for preparing electrolytic zinc.—Page 729.

* * *

Failures practically eliminated by subjecting connecting rods to deflection test. Rod is placed on V-blocks with middle of web underneath a notched bar, to which weights are attached. Compressed air keeps bar free of rod until load is to be applied.—Page 728.

* * *

Structural steel fabrication and erection record is aided by use of radial drills mounted on wheels which run on T-head rails, permitting the machines to be moved along the work. Framework of 71-story bank building will be completed in less than four months.—Page 730.

* * *

Hones bearings and throws of crankshafts simultaneously. Honing heads on special machine are adjustable vertically and horizontally. They need to be set only once for a given size of crankshaft.—Page 728.

* * *

Plain carbon steels can be nitrided just as hard as nitralloy steels, metallurgist declares. The steels must be put in the sorbitic condition, but nitriding steels require higher temperatures and a severer quench. Advocates duplex nitriding—at high, then low, temperatures.—Page 740.

Cast iron not far behind alloy steels in resistance to sea-water corrosion. Five-year test proves 36 per cent nickel steel to be most resistant of all metals tested. Next is 13.5 per cent chromium, although cast iron is nearly as good.—Page 742.

* * *

Electric flaw detector may solve problem of non-destructive weld testing. An attempt is being made to adapt to this purpose the machine now satisfactorily used for rail tests. It detects openings of microscopic widths. —Page 741.

* * *

What causes nitriding hardness? No adequate explanation has been made as yet, although it seems to be caused by space lattice distortion.—Page 739.

* * *

Blue brittleness not due to nitrogen, says metallurgist. As proof, he cites that Izett steel, with 0.017 per cent nitrogen, is free from this phenomenon, while soft steel containing only 0.008 per cent nitrogen is very brittle at 300 deg. C.—Page 734.

* * *

Gets maximum value out of convention by assigning certain men to "cover" certain sessions. The men meet at the end of each day to compare notes.—Page 736.

* * *

"Delivery premiums" absent in period of record steel demand. Steel industry, though crowded to make deliveries, did not attempt to advance prices on that account. Whether or not a decline in demand will bring with it lower prices depends largely on sellers, as the natural tendency of the buyer is to be on the lookout for price reductions.—Page 782.

A. I. FINDLEY
Editor

THE IRON AGE

W. W. MACON
Managing Editor

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Steel Output and Prices

EVERY time steel prices have weakened the criticism has been made, and rightly, that some producers were trying to sell a greater tonnage than the state of demand warranted. It will now be in point, therefore, for sales executives to reflect that the steel trade has been in a period of altogether exceptional demand. There is a wide gap between averages and the records recently made. It is human nature to think of records rather than averages and we bring too much of the sporting idea into business. It is quite proper to think of the record high jump in athletics rather than the average of all the jumps that men have made. But athletics is purely competition and steel is something else.

Reference should be made to the graph on page 685 of last week's IRON AGE, depicting the course of steel ingot production since the beginning of 1921 and the general trend line of the period. A big bulge in steel production began at the middle of last year. The graph shows for several years the familiar course of production declining somewhat from the first half to the second half, and last year is conspicuous by not having that decrease. June, the low month of last year, was simply on the general trend line; subsequent months were well above it, while all of this year has been far above.

The trend line in the graph is mathematically accurate, having been computed. One might say that these are new times and we ought to be above the general line; but as a matter of fact the comparison really runs a little bit the other way, in that the computation includes the very poor year 1921. That pulls down the first point in the trend line, while the heavy production of last year pushes the last point up. The trend line in the graph probably has a greater slope upward than a trend line would have if computed by omitting 1921 and 1928. Even the trend line given, however, crosses the end of this year at 150,000 tons daily steel ingot production. That would be nearly one-fourth under the peak rate of last May and one-fifth under the average rate this year to Sept. 1.

Will sales executives conduct themselves during the next few months in the light of these facts? In the long run the total of demand will conform to the general trend. It cannot always run along at the peak. In the past every peak has been followed by a trough, the only variation having been as to when the trough came and how deep it was. We are now speaking only of the trend line, not suggesting a dip in future below the line.

So far as we are aware the buyers of steel are not asking for lower prices. They certainly must feel that the industry treated them well this year, when for the first time in six years it was really crowded to make deliveries and fell behindhand, yet did not attempt to advance prices on that account; and there were none of the "delivery premiums" that were often so marked before the war.

By no means does it follow that the individual buyer will not be on the lookout for lower prices. His position is entirely natural. Without having any wish that the market price of a finished steel product should decline, he certainly wants to get the benefit of any concession and his only course is to try the thing out for himself. Granting that it is to the advantage of buyers as a class to have steady prices, the individual buyers cannot be expected to cooperate to that end. They are as suspicious of each other as are steel sellers. It is more the function of sellers than of buyers to hold prices.

Greater Future for Material Handling

"YOUR labor-saving equipment is wonderful, but in Europe it would not pay. Wages are too low."

So often has the remark been made by visitors to the United States that it is widely accepted as a statement of fact. It remained for Americans operating in a foreign country to prove the contrary. How the Guggenheim interests successfully replaced labor where it is cheap was told in an article in THE IRON AGE of Sept. 12, on the methods introduced in their Chilean nitrate operations. Not merely justifying its cost, but revolutionizing the entire nitrate industry in the South American republic, the achievement of the Guggenheim company is fairly epoch-making.

While the specific application of handling mechanism to the production of nitrate may not be of direct interest to metal-working companies, the broad lesson it teaches is far-reaching. Aside from demonstrating that cheap labor can be replaced, the Chilean operation makes it clear that such a result requires more than the purchase of material-handling machines —it rather means the solution of a difficult engineering problem through the correlation of methods and equipment in a smoothly working, integrated system.

As the conception of mechanical handling as a distinct branch of engineering gains ground the list of possible economies will multiply. In an interview in this issue of THE IRON AGE, Harry L. Horning, president of the Waukesha Motor Co., explains that each operation in his plant is given special study from a material handling point of view; but he adds: "We are convinced that the greatest opportunity for

further economy lies in reducing the time of putting a piece in a machine and taking it out."

With the perfection of mechanical handling, more will be heard of technological unemployment. In some aspects it may be regrettable that men have been displaced by machines ever since the industrial revolution, but it cannot be gainsaid that in the long run all classes of the population have benefited. Moreover, so far as the individual manufacturer is concerned, he has no alternative. As Mr. Horning says, cost reduction is prerequisite to greater volume and volume is essential to cost reduction.

Robbing East to Pay West

ONCE on a time Colorado was a great mining State and Telluride, in the San Juan region, was one of its bright centers. Mines are exhaustible, however, and rather long ago the mining industry of the State had seriously waned, including mining at Telluride. The Smuggler-Union mine at that place was one of the longest survivors, but recently its owner, a Boston company, bowed to the inevitable. The officers of the little Bank of Telluride did not appreciate that mines die, even as did Methuselah, and allowed that local institution to become insolvent.

In order to avert loss to his creditors and depositors, C. D. Waggoner, president of the bank, devised and executed a plan to get contributions aggregating half a million dollars out of six New York banks. In bankers' code, which as a banker he possessed, he telegraphed instructions in the name of several Denver banks to their New York correspondents to transfer sums to the Chase bank to the credit of the Bank of Telluride. Then, as president of the latter, he presented himself at the Chase bank, satisfactorily identified himself, and obtained payment from it, which he used to settle New York indebtedness of his own bank, remitting the remainder for the benefit of its depositors and keeping nothing for himself.

There have been editorial remarks on the gullibility of the six New York banks that were robbed. Apparently, however, the whole procedure was in regular banking order. The only surprising feature in this respect is that the bankers while using a code among themselves do not have a system of identifying indicators such as are employed in cable communication, unerringly establishing the authority for sending a dispatch. Mr. Waggoner as a banker might properly have the bankers' code, just as many commercial houses possess the Bentley code, but he should not have known the identification of any Denver bank any more than the combination of its safe. This simple system is, of course, an adaptation of the insolvable book cipher. We are aware that the rules of our telegraph companies do not permit the use of indicators in domestic correspondence, but they do not prohibit keyed signatures.

Mr. Waggoner, when apprehended, readily admitted that he was guilty of criminal acts, but justified them on the ground that Wall Street had shut down the mines of his district, wherefore it ought to pay damages, even if vicariously. Moreover, he thought it essentially right to take money from rich persons in the East and give it to poor people in the West. Finally, the six big New York institutions would not greatly miss $500,000, anyhow.

Most of our readers will immediately agree that this reflects insanity and will expect that Mr. Waggoner will become a subject for the alienists. Yet is it not true that he is but making a raw, naive expression of the idea that is in the heads of many persons in the West, and in the heads of their exponents in the Senate of the United States, whom we miscall progressives and otherwise characterize as agrarians or the mental heirs of the populists?

More and More Art in Metal Display

AN editor who goes to many meetings and expositions is liable to acquire the idea that one exposition in the metal trades is like another, perhaps more so. But even a casual glance at the Eleventh National Metal Exposition held last week in Cleveland impressed him that here was one that was different—notably better looking than any predecessor. Analyzing the situation, discounting the imposing surroundings in the Public Auditorium and the quiet, restful illumination, he concluded that the effect was due to a very liberal use of bright metal.

Manufacturers seem at last to have taken to heart the facts that architects, artists and decorators have known for long and are using to a growing extent; namely, that beautiful effects can be created with stainless steel, silvery aluminum, red copper and yellow brass, and that bright metal of all sorts has a pleasing luster that is obtainable in no other medium. As time goes on and the booth designers become more skilled in developing the possibilities of metal they will undoubtedly learn how to balance correctly the bright metal against a velvety background and harmonize the lighting effects into an ensemble which delights the eye. Without making invidious comparisons, it is worthy of note that the Aluminum Co. of America, in most discouraging surroundings in the annex, was able to erect an exhibit of great artistic merit, one which will stand out as a leader in the movement toward the adequate and beautiful displays of metal products we shall see in the future.

Scrap Supply and Prices

DEALERS in scrap iron and steel have wondered why their market in the past 60 days has not been stronger, in view of the fact that steel ingot production has been 90 per cent or more of capacity, and that the supply of steel works grades, particularly of good heavy melting steel scrap, has not seemed overplentiful. One explanation is that the governing factor in prices is how quickly steel manufacturers must have shipments on their purchases. If there is strong pressure for deliveries of finished steel products, the method commonly used in meeting such a condition is to speed up steel-making operations, and that is often accomplished by increasing the ratio of scrap to pig iron in the charge. The scrap metal having been once refined does not require nearly so long a time in the bath as does pig iron.

It is only necessary to go back to the early part of the year to find that scrap prices showed greatest strength coincident with the heavy advance orders in

steel products and an insistent demand for prompt shipments. When the mills began to catch up with their obligations the need of forced steel production abated, and with it the demand for scrap.

The supply of scrap naturally has an influence on prices, but it is to be questioned if it is as much of a factor as the manner in which steel makers want deliveries. Technically scrap is scarce on a rising market, because those who produce it not only want to get as much for it as possible, but are encouraged to hold it by active and widespread competition, usually an accompaniment of a strong market. Conversely, supplies are always plentiful in a declining market. There is probably less variation in the actual supply than is indicated by the fluctuation in prices.

In stock market operations the ordinary impulse is to sell when prices are weak and to buy when the trend is strongly upward. The reverse is the method followed by those who have made fortunes in stocks. Next to the securities market comes the scrap market in its response to human impulses. This is due to the fact that since the beginning scrap dealers have been taking orders for something they had to buy and the business has evolved into one of matching wits. In the past two years the melter, rather than the dealer, has had the better of the contest.

Should there be any easing of scrap prices in the next 60 days, it would be due chiefly to more orderly purchases, since it is well established that the steel trade is back on a "purchase for requirement" basis. That suggests a like mode of steel raw materials purchases, and indifference on the part of steel makers invariably stimulates sales activity on the part of scrap dealers.

Circles and Spirals in Business

TRADE in the United States in the last seven years has been marked by a steadiness unparalleled by anything in the past, or, to put it in another way, we have had a period of activity unprecedented in length. That is the general and long-range view; but since the middle of last year we have had a period within a period, one of activity above the general rate of the seven years. The prolongation of prosperity had come to be an accepted fact, but now with this extra movement there is much discussion as to where we stand today.

It is largely a question of economics, or let us say a matter of circles or spirals. We recall the ascending and descending spirals of the past. But whatever language may have been used of late in describing the course of affairs over the seven years the meaning is the same, that we have been having a circle instead of a spiral. The essence of the problem is to determine whether our circle is developing into a spiral. In other words, is there a balance or are there elements in the activity which will produce still greater activity or will themselves fail?

It appears from the record to date that one suspected element has not worked out unfavorably. A couple of years ago there was much talk of "technological unemployment." Improvements had been made to preserve or increase profits, giving an appearance of prosperity, but men were being released from employment and the result might be decreased buying power. The mass production associated with these improvements required large buying power, and there appeared to be an element working for a descending spiral. The showing would be cumulative; but instead we now have less, not more, appearance of this technological unemployment.

A later fear has been in connection with the stock market. Profits, paper or otherwise, increased the volume of buying and produced better earnings for the corporations, raising their shares again, and thus making an element for an ascending spiral which could not keep going, for necessarily there would not always be a supply of fresh buyers or bidders in the stock market. This fear is still with us; but there are some who assert that buying of shares has become so selective that the menace is at least greatly reduced.

From another angle, the influence of the automobile industry needs to be scrutinized. A rise in the volume of automobile buying began last year and this year has reached spectacular proportions, statistically speaking. With such a new industry it is impossible to gage closely its influence upon general trade activity, but most observers insist that the influence is large. There can be no doubt that the buying of automobiles is particularly sensitive to changes in buying power, made by trade activity and what occurs in the stock market. Here we have an element plainly marked as capable of making a spiral, the influence in the recent past being upward, while there will be much doubt whether further increase in the influence can be expected.

Sees Danger in Growing Bigness of Big Business

The only "fly in the ointment" is the continued expansion of big business. And it is possible that the time may come when there will be only one corporation for each particular trade or industry. Such a possibility is suggested by the combination of a number of wholesale dry goods concerns recently effected in an effort to meet the competition of the chain store systems.

Such a combination is entirely logical, but it foreshadows the time when all dry goods stores will be under one management and competition will be ended. It is a development which leads directly to socialism or the passage of anti-trust laws far more drastic than those now on the statute books. Probably sleeping dogs will be allowed to sleep while times are good; but the bigness of big business is certain to be a political issue when the tide turns and prosperity begins to wane.—Theodore H. Price in *Commerce and Finance.*

Practically the whole of the scrap material from the ex-German battleships and cruisers raised by Cox & Danks, Ltd., at Scapa Flow, Scotland, has, according to *Engineer* (London), "found its way to America, Germany and Scandinavia, in which countries there appears to be a keen demand for the alloy steels and other specia' metals employed in naval construction."

Authorizes Steel Mill Bearings Research

Division of Mechanical Engineers Would Set Up Fellowship on Heavy-Duty Roller Bearings

SPECIAL investigation of roller bearings applied to the roll necks of rolling mills was authorized by a meeting of the iron and steel division of the American Society of Mechanical Engineers at Cleveland, Sept. 13. The report of a special research committee of the division, having to do with heavy-duty anti-friction bearings, recommended the establishment of a research fund of $4,000 for the use of a fellowship at the Carnegie Institute of Technology, Pittsburgh, under the direction of Prof. W. Trinks. The plan looks to a two-year program of study and tests, and, in accepting the report, the committee will probably canvass the industry in the immediate future to get together the money needed. Presumably bearing makers, builders of rolling mills and the steel mills themselves will be approached for support.

The committee, which is expected to have oversight in respect to procedure, is composed as follows: Prof. W. Trinks, Carnegie Institute of Technology, chairman; Bryant Bannister, National Tube Co., Pittsburgh; H. E. Brunner, chief engineer, S-K-F Industries, New York; George C. Farkell, superintendent of rolling mills, National Tube Co., Lorain, Ohio; S. G. Koon, associate editor, THE IRON AGE, New York; R. C. Stiefel, Ellwood City, Pa.; H. H. Talbot, chief engineer, United Engineering & Foundry Co., Pittsburgh; S. M. Weckstein, Timken Roller Bearing Co., Canton, Ohio.

The scope of the investigation as outlined in a preliminary way by the committee covers both hot and cold rolling. The classes in hot rolling are to include four-high strip mills and two-high merchant, billet and strip mills. In cold rolling both two-high and four-high strip mills are to come under the investigation. At the outset the committee expects particular attention will be paid to the methods to be used in determining neck pressure, such as hydraulic jacks under the housing screws or extensometer under the screws, or Brinell plates under the screws.

Among the data expected to come out of the research are pressures between rolls for different sections rolled, also the temperatures, reductions, speeds and power consumption with either plain or roller bearings.

195,000 Lb. of Tin Plate Scrap Detinned a Year

About 195,000 tons of tin plate scrap are treated annually at detinning plants, according to information obtained by Horace W. Johnson, examiner for the Interstate Commerce Commission and submitted to that body in a freight rate matter.

During the past few years, the report points out, improved methods of tinning metal sheets have greatly reduced the amount of surface tin, which has rendered tin plate scrap less valuable and less profitable to handle. The examiner declared that at present the recoverable quantity of tin from tin plate scrap does not exceed 1.4 per cent. In 1925, the report stated, the recovery of tin by the Vulcan Detinning Co. was 36.7 lb. per gross ton of tin plate scrap, while in 1928 it amounted only to 29.7 lb.

Since 1928, it was said in the report, the detinning plants have furnished an outlet for tin plate scrap and have created a movement of considerable tonnage, not only of the tin plate scrap itself but also the recovered sheet steel scrap, the tetrachloride of tin, tin oxide, metallic tin and other materials entering into the process or resulting from the process of detinning tin plate scrap.

Recovered scrap steel, usually compressed into bundles, and shipped to steel mills for remelting purposes was said to sell for about 90 per cent of the market value of heavy melting steel scrap. It was said that the prices paid for tin plate scrap vary, but the average is $9.21, shipping point, when consigned to Sewaren, N. J., $5.25 to Neville Island, Pittsburgh, and $5.80 to East Chicago. The higher price paid for tin plate scrap for delivery to Sewaren, N. J., where the Vulcan Detinning Co. has a large plant, was said to be due to keen competition in the seaboard territory for such supplies for shipment to Germany and Italy.

Plants of the Vulcan Detinning Co. are located at Neville Island, Pittsburgh, and Streator, Ill., in addition to the one at Sewaren, N. J. Other companies which use the detinning process are the Metal & Thermit Corporation, New York, and the Continental Can Co., New York. These companies complained to the Interstate Commerce Commission of existing freight rates on tin plate scrap. The report of the examiner was that existing rates are not unreasonable or unlawful.

More British Iron and Less Steel in August

LONDON, ENGLAND, Sept. 12. (*By Cable*).—Production of pig iron in August was 682,000 gross tons and that of steel ingots and castings was 753,300 tons. The August pig iron output was the largest this year. That for steel was the sixth largest, with the peak at 859,900 tons in March.

Comparisons of recent output with other periods is as follows:

	Pig Iron, Gross Tons	Steel Ingots and Castings, Gross Tons
1913—Av. monthly	855,000	638,600
1920—Av. monthly	669,500	755,600
1922—Av. monthly	408,500	490,100
1923—Av. monthly	620,000	706,800
1924—Av. monthly	609,900	685,100
1925—Av. monthly	519,700	616,400
1926—Av. monthly	203,500	296,700
1927—Av. monthly	607,800	758,200
1928—Av. monthly	550,900	710,400
1929—Av. first quar.	558,000	801,400
1929—April	611,300	808,600
1929—May	654,800	840,400
1929—June	657,800	830,900
1929—July	671,900	803,800
1929—August	682,000	753,300

The August output of pig iron compares with a monthly average of 599,600 tons for the first half. The steel production last month compares with 814,000 tons a month for the first half.

Hannibal Green's Son & Co., Inc., Troy, N. Y., agent for the Burden Iron Co., has been acquired by a new company of the same name, of which F. J. Keeler is president and M. H. Fitzpatrick treasurer.

British Foreign Trade in Iron and Steel Products

(In Gross Tons)

Item	Imports July	Imports August	Exports July	Exports August
Pig iron and ferroalloys	9,121	9,992	42,289	45,078
Ingots, blooms, billets and slabs	88,173	93,466	2,178	847
Iron bars, rods, angles	15,485	14,464	2,561	1,465
Steel bars, rods, angles	46,590	52,849	31,384	28,580
Structural steel	12,075	15,234	7,979	7,113
Hoops and strips	11,912	18,699	5,650	5,772
Plates and sheets	16,945	16,694	45,078	42,330
Galvanized sheets	.....	.....	53,896	56,785
Tin plate	.....	.....	50,251	43,403
Cast tubes, pipe and fittings	3,622	2,857	11,601	10,869
Wrought tubes, pipe and fittings	6,886	6,076	32,094	34,658
Rails	1,275	826	23,872	29,639
Other railroad material	429	581	13,934	13,902
Wire	6,600	5,834	7,420	8,378
Wire cable and rope	.....	.....	2,547	2,012
Wire nails, including staples	5,605	5,574	295	196
Other wire manufactures	617	275	1,835	2,092
Nails, tacks, rivets and washers	1,345	987	2,128	1,713
Bolts, nuts, screws for metal	1,269	943	2,751	2,228
Iron and steel castings	1,085	1,477	385	295
Iron and steel forgings	1,071	717	198	160
Other manufactures of iron and steel	7,115	7,707	35,468	20,677
Total	237,220	255,192	375,804	358,192

From cablegram of William L. Cooper, commercial attaché, London, to the United States Department of Commerce.

Iron and Steel Markets

Railroad Equipment Demand Develops

Central of Georgia Buys 1000 Cars and Santa Fe Inquires for 5700—Structural Lettings Heavy—Steel Output Down to 85 Per Cent

RAILROAD buying and construction work are auspicious factors in a steel market still characterized by uncertainty.

The expected upswing in railroad equipment demand is materializing and the customary fall rail buying movement is gathering momentum. The Central of Georgia has bought 1000 freight cars and the Norfolk & Western has placed 1000 car bodies. The Santa Fe is inquiring for 5754 cars and the Southern for 2000, while the Chesapeake & Ohio is named as a probable buyer.

An order for 50,000 tons of rails and 12,000 tons of track supplies has been placed by a Western railroad, and two new rail inquiries at Chicago total 100,000 tons. The Pennsylvania and New York Central are expected to come into the market for about 200,000 tons each before the close of the month.

Construction taking steel promises to keep up at the high rate of August. Structural steel lettings for the week totaled 50,000 tons, and pending work was augmented by fresh inquiries for 57,000 tons, including 40,000 tons for the Empire State Building, New York.

Steel demand, although getting support from two important consuming industries, lacks the widespread buoyancy of previous months. The possibility that the unusually active summer months reflected an overreaching of industrial operations is still taken into account.

Of interest in this connection is a downturn in automobile production, following a short-lived recovery. The change in trend is attributable to curtailed output of low-priced cars, which is more than offsetting increases by companies bringing out new models. Ford output in September, according to present estimates, will decline to 170,000 cars, compared with 205,000 in August.

Plans of farm machinery makers to expand output in October, as they swing into production of spring equipment, are tempered by the unfavorable turn of agriculture, following disastrous droughts in wide areas. Lessened farmer buying power is also affecting the demand for wire products.

Steel mill backlogs are still shrinking and steel production has undergone further reduction. Operations in terms of steel ingot output now range from 80 to 90 per cent. The Steel Corporation's average is 85 per cent, which is also a liberal estimate for the industry as a whole.

Further announcements of the opening of fourth quarter books, usually at unchanged quotations, have resulted in little contracting. Since the market is not advancing, consumers have no price incentive either to specify beyond their immediate needs or to obligate themselves ahead. On the contrary, they are watching for signs of price weakness. Mills, in turn, are not pushing sales lest the stability of prices might suffer.

Pending a real test of prices, few significant changes have occurred. Concessions on shapes, bars and plates, although by no means general, are reported more frequently. On the other hand, sellers of galvanized sheets are taking a firmer stand at 3.60c. a lb., an advance of $2 a ton over the recent market.

Chronic instability in wire products is giving way to open recognition of reduced prices. Most mills are now quoting wire nails at $2.55 and plain wire at $2.40, except to small users. On nails as low as $2.45 is being done in some instances.

Leading makers of steel pipe have notified jobbers that failure to maintain resale prices may result in discontinuing sales to the offenders.

The New York Shipbuilding Corporation has placed 18,000 tons of steel for two vessels to be built for the Export Steamship Co.

Tin plate production is undergoing a seasonal recession, now ranging from 75 to 90 per cent.

Scrap is inactive and weak, but pig iron, temporarily at least, is stronger. Southern producers of merchant iron have accumulated substantial backlogs in the past 30 days, booking 125,000 tons in the St. Louis district alone, and their output has been further reduced by the blowing out of another furnace. The lowest price now current in the North on Alabama foundry iron is $13, Birmingham, or 50c. a ton above the low point, and $13.50 is rapidly becoming the minimum.

Pig iron buyers are cautious, well aware that surplus steel company iron may soon be more of a market factor, but purchases are in fair volume, indicating sustained requirements. Sales in New York, totaling 26,000 tons, included 15,000 tons for a radiator plant. Cleveland reported bookings of 24,000 tons. The Ford company has bought 5000 tons of high-silicon malleable from an Ontario furnace and may buy 5000 tons additional.

Fabricated structural steel lettings in August (computed) were 365,750 tons, a new monthly record.

THE IRON AGE composite price for pig iron has advanced from $18.25 to $18.29 a gross ton and is 66c. higher than a year ago. Finished steel remains for the sixth week at 2.398c. a lb., which is $1 a net ton above the figure of 12 months ago.

A Comparison of Prices

Market Prices at Date, and One Week, One Month and One Year Previous. Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron, Per Gross Ton:	Sept. 17, 1929	Sept. 10, 1929	Aug. 20, 1929	Sept. 18, 1928
No. 2 foundry, Philadelphia	$21.26	$21.26	$21.26	$20.76
No. 2, Valley furnace	18.50	18.50	18.50	17.00
No. 2 Southern, Cin'ti	17.19	17.19	17.69	19.94
No. 2, Birmingham	14.50	14.50	14.50	16.25
No. 2 foundry, Chicago*	20.00	20.00	20.00	18.50
Basic, del'd eastern Pa.	19.75	19.75	19.75	19.00
Basic, Valley furnace	18.50	18.50	18.50	16.25
Valley Bessemer, del'd P'gh.	20.76	20.76	20.76	19.01
Malleable, Chicago*	20.00	20.00	20.00	18.50
Malleable, Valley	19.00	19.00	19.00	17.25
Gray forge, Pittsburgh	19.76	19.76	19.76	18.26
L. S. charcoal, Chicago	27.04	27.04	27.04	27.04
Ferromanganese, furnace	105.00	105.00	105.00	105.00
Rails, Billets, Etc., Per Gross Ton:				
Rails, heavy, at mill	$43.00	$43.00	$43.00	$43.00
Light rails at mill	36.00	36.00	36.00	36.00
Rerolling billets, Pittsburgh	35.00	35.00	35.00	32.00
Sheet bars, Pittsburgh	35.00	35.00	35.00	32.00
Slabs, Pittsburgh	35.00	35.00	35.00	32.00
Forging billets, Pittsburgh	40.00	40.00	40.00	38.00
Wire rods, Pittsburgh	42.00	42.00	42.00	42.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb.	1.85	1.85	1.85	1.90
Finished Steel,				
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Bars, Pittsburgh	1.95	1.95	1.95	1.90
Bars, Chicago	2.05	2.05	2.05	2.00
Bars, Cleveland	1.95	1.95	1.95	1.90
Bars, New York	2.29	2.29	2.29	2.24
Tank plates, Pittsburgh	1.95	1.95	1.95	1.90
Tank plates, Chicago	2.05	2.05	2.05	2.00
Tank plates, New York	2.22½	2.22½	2.22½	2.17½
Structural shapes, Pittsburgh	1.95	1.95	1.95	1.90
Structural shapes, Chicago	2.05	2.05	2.05	2.00
Structural shapes, New York	2.19½	2.19½	2.19½	2.14½
Cold-finished bars, Pittsburgh	2.30	2.30	2.30	2.10
Hot-rolled strips, P'gh	1.90	1.90	1.90	1.85
Cold-rolled strips, P'gh	2.75	2.75	2.75	2.75

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

Finished Steel,	Sept. 17, 1929	Sept. 10, 1929	Aug. 20, 1929	Sept. 18, 1928
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Sheets, black, No. 24, P'gh	2.85	2.85	2.85	2.65
Sheets, black, No. 24, Chicago dist. mill	2.95	2.95	2.95	2.75
Sheets, galv., No. 24, P'gh	3.50	3.50	3.50	3.40
Sheets, galv., No. 24, Chicago dist. mill	3.60	3.60	3.60	3.60
Sheets, blue, No. 13, P'gh	2.35	2.35	2.35	2.00
Sheets, blue, No. 13, Chicago dist. mill	2.45	2.45	2.45	2.10
Wire nails, Pittsburgh	2.45	2.55	2.55	2.55
Wire nails, Chicago dist. mill	2.50	2.60	2.60	2.60
Plain wire, Pittsburgh	2.40	2.40	2.40	2.40
Plain wire, Chicago dist. mill	2.45	2.45	2.45	2.45
Barbed wire, galv., P'gh	3.20	3.20	3.20	3.20
Barbed wire, galv., Chicago dist. mill	3.30	3.30	3.30	3.25
Tin plate, 100 lb. box, P'gh	$5.35	$5.35	$5.35	$5.25
Old Material, Per Gross Ton:				
Heavy melting steel, P'gh	$18.25	$18.25	$19.00	$16.75
Heavy melting steel, Phila	16.50	16.50	16.50	15.50
Heavy melting steel, Ch'go	15.00	15.25	15.25	13.00
Carwheels, Chicago	14.00	14.00	14.00	13.50
Carwheels, Philadelphia	16.50	16.50	16.50	16.00
No. 1 cast, Pittsburgh	15.50	15.50	15.50	15.00
No. 1 cast, Philadelphia	16.50	16.50	16.50	16.50
No. 1 cast, Ch'go (net ton)	14.50	14.50	14.50	15.00
No. 1 RR. wrot., Phila	16.00	16.00	16.00	15.00
No. 1 RR. wrot., Ch'go (net)	14.00	14.00	14.00	12.00
Coke, Connellsville, Per Net Ton at Oven:				
Furnace coke, prompt	$2.65	$2.65	$2.75	$2.75
Foundry coke, prompt	3.75	3.75	3.75	3.75
Metals,				
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York	18.12½	18.12½	18.12½	15.00
Electrolytic copper, refinery	17.75	17.75	17.75	14.75
Tin (Straits), New York	45.00	45.37½	46.50	48.00
Zinc, East St. Louis	6.80	6.80	6.80	6.25
Zinc, New York	7.15	7.15	7.15	6.60
Lead, St. Louis	6.70	6.70	6.55	6.32½
Lead, New York	6.90	6.90	6.75	6.50
Antimony (Asiatic), N. Y.	8.75	8.75	9.00	10.87½

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

Pittsburgh

Steel Mill Operations Lowest in Several Months—New Business Not in Large Volume

PITTSBURGH, Sept. 17.—Steel works operations have eased off slightly in the last week and are probably under 90 per cent of capacity in this district for the first time in several months. This is due largely to gradual curtailment by the larger producers which have reduced their backlogs considerably in the last few weeks. In the meantime, specifications have been far from sufficient to sustain such a high operating rate and heavier fall demand has not developed.

At this time tonnage releases of large steel consuming industries are reaching the mills steadily, but not in large volume, indicating that users of steel are watching the turn of the market very closely with a view to ascertaining future trends. With most mills in a position to make deliveries on steel in about the time required for rolling, it is no longer necessary to place orders in advance as was the case in the spring and early summer when mill facilities were taxed to the utmost. Consequently the present declining tendency in operating schedules is interpreted by some as merely the adjustment of current production to current demand, an adjustment which would have taken place several weeks earlier had it not been for the heavy backlogs accumulated during the height of spring demand.

It is also pointed out that specifications are satisfactory for this season of the year and compare favorably with those of previous similar periods. The impression of dullness is merely accentuated by the abnormally heavy summer demand for steel.

The past week has brought out little which might indicate the trend of fall business. Consumers generally are cautious in placing their fourth quarter contracts and sellers are not anxious to push sales in view of the weakening effect this might have on prices. In the case of sheets it will still be several weeks before shipments against present specifications are fully completed, and makers with comfortable backlogs are not failing to take advantage of their situation by firmer stand on prices, particularly on galvanized material. The extent of buying in the next month will decide whether or not they will be successful.

At present, prices on nearly all products have a rather uneasy tone, but, if concessions are being made, they are being well concealed. Shading is reported occasionally from competitive districts where buyers are making the most of advantages which they have enjoyed to a greater or less extent for some time.

Third quarter prices have generally been reaffirmed, although in the case of some grades of sheets such quotations have been the maximum and represent an advance to some buyers. Makers of nails and wire have recognized recent weakness in announcing fourth quarter prices, although they are still quoting $2.65 a keg for nails and 2.50c. a lb. for wire to small buyers, prices which were recently disappearing on most transactions.

The pig iron market retains its price strength, but fourth quarter buy-

ing is still being delayed by the majority of consumers. Inquiry is improving and two round tonnages of basic are reported to be actively pending in the Valleys.

The tone of the scrap market is still very weak, but mill buying is lacking and lower quotations are not justified either by sales to mills or purchases by dealers.

Pig Iron.—This week has been another of comparative quiet so far as large purchases are concerned, and one important seller estimates that considerably less than half of the iron which will be bought for fourth quarter delivery has been placed thus far. The radiator maker at Uniontown, Pa., has not yet closed in full against its recent inquiry, and other large tonnages are said to be pending. In the Valley district at least two large lots of basic iron are soon to be closed, and merchant furnaces in that district are gradually building up their order books. Stocks of iron are low, and September shipments, while hardly equal to the August rate, are generally thought to be satisfactory. Some buying will be delayed until early in October on account of the uncertainty of the steel industry, but, with pig iron consumers operating with very low stocks, it is practically certain that nearly all of them will have to cover within the next 30 days. The price situation is unchanged and seems to be very steady in the Valley territory. Reports of shading in the immediate Pittsburgh district are heard, but recent sales at the full quoted schedules of the Pittsburgh furnace seem to justify present quotations.

Prices per gross ton, f.o.b. Valley furnace:

Basic	$18.50
Bessemer	19.00
Gray forge	18.00
No. 2 foundry	18.50
No. 3 foundry	18.00
Malleable	19.00
Low phos., copper free	27.00

Freight rate to Pittsburgh or Cleveland district, $1.76.

Prices per gross ton, f.o.b. Pittsburgh district furnace:

Basic	$19.00
No. 2 foundry	19.00
No. 3 foundry	18.50
Malleable	19.50

Freight rates to points in Pittsburgh district range from 63c. to $1.13.

Semi-Finished Steel.—Shipments to non-integrated companies have declined in September, as compared with the previous month, and buying for fourth quarter has not yet developed to any appreciable extent. Consumers apparently feel that there will certainly be no advance over the present $35 quotations on billets, slabs and sheet bars, and are also probably anxious to get a better idea of their requirements over the last three months of the year before making commitments. There is also objection to the quoted prices on billets and slabs, as strict adherence to this quotation would mean an advance of $1 a ton to large buyers. Shipments of wire rods are steady and show little reduction from the rate in August. Fourth quarter contracts are being taken at $42 a ton, Pittsburgh or Cleveland, and there seems to be no question as to the firmness of the price.

Bars, Shapes and Plates.—Mill backlogs on the heavy hot-rolled products are at the lowest point in several months, and, although tonnage releases are still coming in rather steadily, their volume has declined considerably since Labor Day. Pittsburgh mills are now in a position to ship plates in about three weeks, and deliveries on bars and shapes may be had in a shorter time. Considering the fact that plate backlogs averaged about six weeks on Aug. 1, the extent to which mill operations have been maintained on the strength of backlogs in the last month is clearly indicated. Structural business is not particularly active, but the volume of awards is fairly steady and fabricating shops in the district are not badly in need of business. Barge builders are also taking large shipments of plates and shapes, but their backlogs are dwindling and a few recent barge orders have been filled from stock. Mills in this district are interested in the inquiry of the Norfolk & Western for 2000 hopper cars, and it is quite likely that steel for at least half of this order will come from Pittsburgh makers. Prices have not developed definite weakness, although the tone of the market is not so firm as it was a short time ago. Occasional reports of shading the price of bars in the East are reported, although this situation has existed intermittently all summer and does not represent a new market tendency. Prices on structural shapes are also questioned in Eastern territory, although this situation is brought about by the competition of the Eastern producers, and has not yet been felt in the natural territory of Pittsburgh mills.

Rails and Track Accessories.—Following its inquiry for 54,000 tons of rails, the Chesapeake & Ohio is also inquiring for 10,000 tons of tie plates and will probably place this business before the end of the month. The Norfolk & Western recently divided an order for 1500 tons of tie plates between the Bethlehem Steel Co. and the Wheeling Steel Corporation. Otherwise no definite inquiries for rails and track accessories have come out in this district, although it is believed that additional tonnage will come before the trade before the end of the month.

Bolts, Nuts and Rivets.—Makers of bolts and nuts have reaffirmed third quarter prices for the last three months of the year, the general quotation being 70 per cent off list. Prices on rivets are also unchanged, the ruling figure on the large size being $3.10 a 100 lb., while 7/16 in. and smaller are offered at 70 and 10 per cent off list. Makers are still maintaining a comparatively high rate of operation, the general average for the industry being somewhere between 70 and 75 per cent.

Wire Products.—Makers of wire and nails will quote the present range of prices on both products for the fourth quarter. On small tonnages of nails, the $2.65 per keg, Pittsburgh, price will rule, while larger buyers will be given the $2 a ton advantage. On wire, the quotations are 2.40c. and 2.50c. a lb. Business in September is about equal to August on manufacturers' wire, while the jobbing trade seems to be less active than before. These buyers are taking very small tonnages in an effort to keep stocks at a minimum.

Tubular Goods.—The pipe market is rather quiet, although business is generally considered satisfactory, and operations are good. One estimate places lap-weld mills at 80 per cent of capacity, although this figure may be about five points too high. Opera-

The Iron Age Composite Prices

Finished Steel

Sept. 17, 1929, 2.398c. a Lb.

One week ago	2.398c.
One month ago	2.398c.
One year ago	2.348c.
10-year pre-war average	1.689c.

Based on steel bars, beams, tank plates, wire, rails, black pipe and black sheets. These products make 87 per cent of the United States output of finished steel.

	High		Low	
1929	2.412c.,	April 2;	2.391c.,	Jan. 8
1928	2.391c.,	Dec. 11;	2.314c.,	Jan. 3
1927	2.453c.,	Jan. 4;	2.293c.,	Oct. 25
1926	2.453c.,	Jan. 5;	2.403c.,	May 18
1925	2.560c.,	Jan. 6;	2.396c.,	Aug. 18

Pig Iron

Sept. 17, 1929, $18.29 a Gross Ton

One week ago	$18.25
One month ago	18.42
One year ago	17.63
10-year pre-war average	15.72

Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

	High		Low	
1929	$18.71,	May 14;	$18.25,	Aug. 27
1928	18.59,	Nov. 27;	17.04,	July 24
1927	19.71,	Jan. 4;	17.54,	Nov. 1
1926	21.54,	Jan. 5;	19.46,	July 13
1925	22.50,	Jan. 13;	18.96,	July 7

Mill Prices of Finished Iron and Steel Products

Iron and Steel Bars

Soft Steel

	Base per Lb.
F.o.b. Pittsburgh mill	1.95c.
F.o.b. Chicago	2.05c.
Del'd Philadelphia	2.27c.
Del'd New York	2.29c.
Del'd Cleveland	1.92½c. to 1.95c.
F.o.b. Cleveland	1.90c. to 1.95c.
F.o.b. Lackawanna	2.05c.
F.o.b. Birmingham	2.10c.
C.i.f. Pacific ports	2.35c.
F.o.b. San Francisco mills	2.35c. to 2.40c.

Billet Steel Reinforcing

F.o.b. Pittsburgh mills, 40, 50, 60-ft.	2.05c.
F.o.b. Pittsburgh mills, cut lengths	2.30c.
F.o.b. Birmingham, mill lengths	2.10c.

Rail Steel

F.o.b. mills, east of Chicago dist.	1.85c. to 1.90c.
F.o.b. Chicago Heights mill	1.95c.
Del'd Philadelphia	2.27c.

Iron

Common iron, f.o.b. Chicago	2.05c.
Refined iron, f.o.b. P'gh mills	2.75c.
Common iron, del'd Philadelphia	2.12c.
Common iron, del'd New York	2.14c.

Tank Plates

	Base per Lb.
F.o.b. Pittsburgh mill	1.95c.
F.o.b. Chicago	2.05c.
F.o.b. Birmingham	2.10c.
Del'd Cleveland	2.14c.
Del'd Philadelphia	2.15c.
F.o.b. Coatesville	2.05c.
F.o.b. Sparrows Point	2.05c.
F.o.b. Lackawanna	2.05c.
Del'd New York	2.22½c.
C.i.f. Pacific ports	2.35c.

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh mill	1.95c.
F.o.b. Chicago	2.05c.
F.o.b. Birmingham	2.10c.
F.o.b. Lackawanna	2.05c.
F.o.b. Bethlehem	2.05c.
Del'd Cleveland	2.14c.
Del'd Philadelphia	2.01c. to 2.06c.
Del'd New York	2.14½c. to 2.19½c.
C.i.f. Pacific ports	2.35c.

Hot-Rolled Hoops, Bands and Strips

	Base per Lb.
6 in. and narrower, P'gh	2.00c.
Wider than 6 in., P'gh	1.90c.
6 in. and narrower, Chicago	2.20c.
Wider than 6 in., Chicago	2.10c.
Cooperage stock, P'gh	2.20c.
Cooperage stock, Chicago	2.30c.

Cold-Finished Steel

	Base per Lb.
Bars, f.o.b. Pittsburgh mill	2.30c.
Bars, f.o.b. Chicago	2.30c.
Bars, Cleveland	2.35c.
Shafting, ground, f.o.b. mill	*2.65c. to 3.60c.
Strips, P'gh	2.75c. to 2.85c.
Strips, Cleveland	2.75c. to 2.85c.
Strips, del'd Chicago	3.05c. to 3.15c.
Strips, Worcester	2.90c. to 3.00c.
Fender stock, No. 20 gage, Pittsburgh or Cleveland	4.25c.

*According to size.

Wire Products

(Carload lots, f.o.b. Pittsburgh and Cleveland, to jobbers and retailers.)

	Base per Keg
Wire nails	$2.45 to $2.55
Galvanized nails	4.45 to 4.55
Galvanized staples	3.15 to 3.25
Polished staples	2.90c. to 3.00c.
Cement coated nails	$2.45 to $2.55

	Base per 100 Lb.
Bright plain wire, No. 6 to No. 9 gage	$2.40 to $2.50
Annealed fence wire	2.55 to 2.65
Spring wire	3.50 to 3.60
Galv'd wire, No. 9	3.00 to 3.10
Barbed wire, galv'd	3.20 to 3.30
Barbed wire, painted	2.95 to 3.05
Woven wire fence (per net ton to retailers)	65.00

Chicago district mill and delivered Chicago prices are $1 per ton above the foregoing. Birmingham mill prices $3 a ton higher; Worcester, Mass. (wire), mill $3 a ton higher on production of that plant; Duluth, Minn., mill $2 a ton higher; Anderson, Ind., $1 higher.

Cut Nails

	Per 100 Lb.
Carloads, Wheeling, Reading or Northumberland, Pa.	$2.70
Less carloads, Wheeling or Reading	2.80

Light Plates

No. 10, blue annealed, f.o.b. P'gh.	2.10c. to 2.20c.
No. 10, blue annealed, f.o.b. Chicago dist.	2.30c.
No. 10, blue annealed, del'd Phila.	2.42c. to 2.52c.
No. 10, blue annealed, B'ham	2.35c.

Sheets

Blue Annealed

	Base per Lb.
No. 13, f.o.b. P'gh	2.25c. to 2.35c.
No. 13, f.o.b. Chicago dist.	2.45c.
No. 13, del'd Philadelphia	2.67c.
No. 13, blue annealed, B'ham	2.50c.

Box Annealed, One Pass Cold Rolled

No. 24, f.o.b. Pittsburgh	2.85c.
No. 24, f.o.b. Chicago dist. mill	2.95c. to 3.00c.
No. 24, del'd Philadelphia	3.17c. to 3.27c.
No. 24, f.o.b. Birmingham	3.10c.

Metal Furniture Sheets

No. 24, f.o.b. P'gh	4.10c. to 4.20c.

Galvanized

No. 24, f.o.b. Pittsburgh	3.50c. to 3.60c.
No. 24, f.o.b. Chicago dist. mill	3.60c. to 3.70c.
No. 24, del'd Cleveland	3.69c. to 3.79c.
No. 24, del'd Philadelphia	3.92c. to 4.02c.
No. 24, f.o.b. Birmingham	3.70c.

Tin Mill Black Plate

No 28, f.o.b. Pittsburgh	2.90c. to 3.00c.
No. 28, f.o.b. Chicago dist. mill	3.00c. to 3.10c.

Automobile Body Sheets

No. 20, f.o.b. Pittsburgh	4.00c. to 4.10c.

Long Ternes

No. 24, 8-lb. coating, f.o.b. mill	4.00c. to 4.10c.

Vitreous Enameling Stock

No. 24, f.o.b. Pittsburgh	3.90c.

Tin Plate

	Per Base Box
Standard cokes, f.o.b. P'gh district mills	$5.35
Standard cokes, f.o.b. Gary	5.45

Terne Plate

(F.o.b. Morgantown or Pittsburgh)
(Per Package, 20 x 28 in.)

8-lb. coating I.C.	$11.20
15-lb. coating I.C.	14.00
20-lb. coating I.C.	15.30
25-lb. coating I.C.	$16.70
30-lb. coating I.C.	17.75
40-lb. coating I.C.	19.85

Alloy Steel Bars

(F.o.b. makers' mill)

Alloy Quality Bar Base, 2.65c. to 2.75c. per Lb.

S.A.E. Series Numbers		Alloy Differential
2000	(¼% Nickel)	$0.25
2100	(1½% Nickel)	0.55
2300	(3½% Nickel)	1.50
2500	(5% Nickel)	2.25
3100	Nickel Chromium	0.55
3200	Nickel Chromium	1.35
3300	Nickel Chromium	3.80
3400	Nickel Chromium	3.20
4100	Chromium Molybdenum (0.15 to 0.25 Molybdenum)	0.50
4100	Chromium Molybdenum (0.26 to 0.40 Molybdenum)	0.70
4600	Nickel Molybdenum (0.20 to 0.30 Molybdenum, 1.25 to 1.75 Nickel)	1.05
5100	Chromium Steel (0.60 to 0.90 Chromium)	0.35
5100	Chromium Steel (0.80 to 1.10 Chromium)	0.45
5100	Chromium Spring Steel	0.20
6100	Chromium Vanadium Bars	1.20
6100	Chromium Vanadium Spring Steel	0.95
9250	Silicon Manganese Spring Steel (flats)	0.25
	Rounds and squares	0.50
	Chromium Nickel Vanadium	1.50
	Carbon Vanadium	0.95

Above prices are for hot rolled steel bars, forging quality. The differential for cold-drawn bars is ¾c. a lb. higher, with standard classification for cold-finished alloy steel bars applying. For billets 4 x 4 to 10 x 10 in., the price for a gross ton is the net price for bars of the same analysis.

Billets under 4 x 4 in. carry the steel bar base. Slabs with a sectional area of 16 in. or over carry the billet price. Slabs with sectional area of less than 16 in. or less than 2½ in. thick, regardless of sectional area, take the bar price.

Rails

	Per Gross Ton
Standard, f.o.b. mill	$43.00
Light (from billets), f.o.b. mill	36.00
Light (from rail steel), f.o.b. mill	34.00
Light (from billets), f.o.b. Ch'go mill	36.00

Track Equipment

	Base per 100 Lb.
Spikes, ⅝ in. and larger	$2.80
Spikes, ½ in. and smaller	2.80
Spikes, boat and barge	3.00
Tie plate, steel	2.15
Angle bars	$2.75
Track bolts, to steam railroads	$3.80 to 4.00
Track bolts, to jobbers, all sizes, per 100 count	70 per cent off list

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

Butt Weld

Steel Inches	Black	Galv.	Iron Inches	Black	Galv.
⅛	45	19½	¼ and ⅜	+11	+36
¼ to ⅜	51	25½	½	23	5
½	56	42½	¾	28	11
¾	60	48½	1 and 1¼	31	15
1 to 3	62	50½	1½ and 2	35	18

Lap Weld

2	55	43½	2	23	9
2½ to 6	59	47½	2½ to 3½	28	13
7 and 8	56	43½	4 to 6	30	17
9 and 10	54	42½	7 and 8	29	16
11 and 12	53	40½	9 to 12	26	11

Butt Weld, extra strong, plain ends

⅛	41	24½	¼ and ⅜	+13	+48
¼ to ⅜	47	30½	½	23	7
½	53	42½	¾	28	12
¾	58	47½	1 to 2	34	18
1 to 1½	60	49½			
2 to 3	61	50½			

Lap Weld, extra strong, plain ends

2	53	42½	1½	29	13
2½ to 4	57	46½	2½ to 4	34	20
4½ to 6	56	45½	4½ to 6	33	19
7 to 8	52	39½	7 and 8	31	17
9 and 10	45	32½	9 to 12	21	8
11 and 12	44	31½			

On carloads the above discounts on steel pipe are increased on block by one point, with supplementary discount of 5%, and on galvanized by 1½ points, with supplementary discount of 5%. On iron pipe, both black and galvanized, the above discounts are increased to jobbers by one point with supplementary discounts of 5 and 2½%.

Note.—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2½ points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Base Discounts, f.o.b. Pittsburgh

Steel		Charcoal Iron	
2 in. and 2¼ in.	40	1½ in.	1
2½ in.—2¾ in.	48	1¾ in.	8
3 in.	54	2 in.—2¼ in.	13
3¼ in.—3¾ in.	56	2½ in.—2¾ in.	16
4 in.	59	3 in.	17
4½ in. to 6 in.	48	3¼ in. to 3½ in.	18
		4 in.	20
		4½ in.	21

On lots of a carload or more, the above base discounts are subject to a preferential of two fives on steel and of 10 per cent on charcoal iron tubes. Smaller quantities are subject to the following modifications from the base discounts:

Lap Welded Steel—Under 10,000 lb., 6 points under base and one five; 10,000 lb. to carload, 4 points under base and two fives. Charcoal Iron—Under 10,000 lb., 2 points under base; 10,000 lb. to carload, base and one five.

Standard Commercial Seamless Boiler Tubes

Cold Drawn

1 in.	63	3 in.	48
1¼ to 1½ in.	55	3¼ to 3½ in.	50
1¾ in.	59	4 in.	53
2 to 2¼ in.	54	4½, 5 and 6 in.	42
2½ to 2¾ in.	42		

Hot Rolled

2 and 2¼ in.	40	3¼ to 3½ in.	56
2½ and 2¾ in.	48	4 in.	59
3 in.	54	4½, 5 and 6 in.	48

Beyond the above base discounts a preferential discount of 5 per cent is allowed on carload lots. On less than carloads to 10,000 lb., base discounts are reduced 4 points with 5 per cent preferential; on less than 10,000 lb., base discounts are reduced 6 points, with no preferential. No extra for lengths up to and including 24 ft. Sizes smaller than 1 in. and lighter than standard gage take mechanical tube list and discounts. Intermediate sizes and gages not listed take price of next larger outside diameter and heavier gage.

Seamless Mechanical Tubing

	Per Cent Off List
Carbon, 0.10% to 0.30%, base (carloads)	55
Carbon, 0.30% to 0.40%, base	50

Plus differentials for lengths over 18 ft. and for commercial exact lengths. Warehouse discounts on small lots are less than the above.

tions of butt-weld mills are not so good, the average for the industry probably holding at about 60 per cent. No further increase is expected in this department before spring. Seamless mills are scheduled as well or better than lap-weld units, although oil country business has developed no marked activity during the entire year. Mechanical and boiler tubing is quiet, but heavier specifying from the automobile industry may improve the situation in the former product within the next 30 days.

Sheets.—Shipments during September are going to compare favorably with those of August, at least from the standpoint of daily rate, but the month will see a sharp reduction in backlogs. Recent specifications have fallen far short of production and consumers are slow in placing their fourth quarter tonnage. This is partially explained by the fact that many large buyers still have material coming to them which was specified several weeks ago, and mills are not anxious to solicit business when deliveries yet to be made on old commitments will occupy them until well into October. However, most makers will now take orders for delivery in three to four weeks on all the common finishes of sheets, while automobile body material may be accommodated more quickly. The leading interest ran its mills last week at better than 95 per cent of capacity and is scheduled for the present week at slightly under 100 per cent. Independent sheet mill operations in Pittsburgh and nearby district average at least 90 per cent. Fourth quarter prices have not been officially announced in this district, although nearly all makers are prepared to take contracts at 2.85c., Pittsburgh, on black sheets, 3.60c. on galvanized, 2.20c. on light plates blue annealed, 2.35c. on blue annealed sheets and 4.10c. on auto body sheets. In the case of galvanized sheets and light plates, this represents an advance of $2 a ton over recent minimums which many makers refused to recognize. Special efforts are being made to hold the price on galvanized material, and no fourth quarter tonnage has been reported placed at less than 3.60c. Concessions of $2 a ton still occur on tin mill black plate, on which the quoted price is 3c., Pittsburgh.

Tin Plate.—The tin plate business is feeling the full effects of the usual dull season at this time of the year, although the leading interest operated its mills last week at 90 per cent of capacity and has scheduled a similar rate for this week. Operations of independents average 75 per cent or less and further curtailment will probably be necessary before improvement develops.

Strip Steel.—Some makers report that the majority of their larger customers have placed their fourth quarter tonnages at the full quoted prices on both hot and cold-rolled strip, although many consumers serving the automobile industry are slow in estimating their requirements. Makers of parts and accessories for the General Motors subsidiaries have been given a close approximation of their requirements over the last three months of the year and the tonnages needed are somewhat larger than expectations in some cases. Strip mills in the district are running at 70 to 75 per cent of rated capacity, a rate which is just about supported by current specifications. On hot-rolled strip, fourth quarter quotations are unchanged at 2c., Pittsburgh, for 6-in. and narrower, and 1.90c. for the wider sizes. Cold-rolled is holding at 2.75c. to 2.85c., Pittsburgh or Cleveland.

Coal and Coke.—The coke market is developing a firmer tone, although the furnace grade is still quotable at $2.65 to $2.75 a ton, Connellsville. Merchant interests have disposed of most of their surplus tonnage at prices within this range or lower, and are now preparing to ask higher figures on fourth quarter contract business. One large furnace interest which is asking for prices on its requirements over the remainder of the year will probably have to pay at least $2.75. The market on foundry coke is still dull, but prices are gaining strength and less material is being offered at sacrifices. As cold weather approaches domestic fuel is more active and quotations are higher. The coal market has a stronger undertone, but prices have not improved appreciably.

Old Material.—Weakness in the scrap market has continued over the past week, but a few dealers believe that a stronger tendency has made itself felt in the last two days. In other words, efforts are being made to stabilize the market, and no dealer would be willing to sell heavy melting steel at less than $18, even though there were buyers. Small sales at $18.25 and $18.50 have been reported during the last week, and occasional distress tonnages have gone at lower figures. Mills show no disposition to buy steel scrap, and hold-ups at one or two important consuming points are largely responsible for the weakness of the market. Other grades of scrap are about the same, although machine shop turnings are now quotable at $11.50 to $12. Sentiment in the scrap market has not improved, but weakness is based on technical conditions and not on actual sales. In view of this, lower quoted prices are hardly justified and may not come out when mill buying does begin.

Prices per gross ton delivered consumers yards in Pittsburgh and points taking the Pittsburgh district freight rate:

Basic Open-Hearth Grades:	
No. 1 heavy melting steel	$18.00 to $18.50
No. 2 heavy melting steel	16.00 to 16.50
Scrap rails	17.50 to 18.00
Compressed sheet steel	18.00 to 18.50
Bundled sheets, sides and ends	16.50 to 17.00
Cast iron carwheels	16.50 to 17.00
Sheet bar crops, ordinary	19.50 to 20.00
Heavy breakable cast	12.50 to 13.00
No. 2 railroad wrought	18.00 to 18.50
Hvy. steel axle turnings	16.50 to 17.00
Machine shop turnings	11.50 to 12.00
Acid Open-Hearth Grades:	
Railr. knuckles and couplers	21.50 to 22.00
Railr. coil and leaf springs	21.50 to 22.00
Rolled steel wheels	21.50 to 22.00
Low phos. billet and bloom ends	22.00 to 22.50
Low phos., mill plates	22.00 to 22.50
Low phos., light grades	20.50 to 21.50
Low phos., sheet bar crops	21.50 to 22.00
Heavy steel axle turnings	16.50 to 17.00
Electric Furnace Grades:	
Low phos., punchings	20.00 to 21.00
Hvy. steel axle turnings	16.50 to 17.00
Blast Furnace Grades:	
Short shoveling steel turnings	12.50 to 13.00
Short mixed borings and turnings	12.00 to 12.50
Cast iron borings	12.00 to 12.50
Rolling Mill Grades:	
Steel car axles	21.50 to 22.00
Cupola Grades:	
No. 1 cast	15.00 to 16.00
Rails 3 ft. and under	20.00 to 21.00

More money was spent in Canada in 1928 on agricultural implements and machinery than in 1927, according to the Dominion Bureau of Statistics, Ottawa. This increase was largely supplied by imported goods, as Canadian production dropped in 1928 to $41,199,841, from $42,996,288, the high record in 1927. Exports, including re-exports, declined to $14,560,412 from $16,559,806, while imports advanced to $39,893,490, from $26,101,338. Deducting exports from the sum of production and imports shows apparent consumption of $66,532,919 in 1928, compared with $52,537,820 in 1927.

The Army Ordnance Association expects an attendance of approximately 10,000 at its eleventh annual meeting to be held on Oct. 10 at Aberdeen, Md., proving ground. Extensive munition and aviation demonstrations have been arranged and among organizations participating will be the National Metal Trades Association and the National Aeronautic Association. Dinner will be followed by the presentation of technical papers and addresses by prominent guests.

Warehouse Prices, f.o.b. Pittsburgh

	Base per Lb.
Plates	3.00c.
Structural shapes	3.00c.
Soft steel bars and small shapes	2.90c.
Reinforcing steel bars	2.75c.
Cold-finished and screw stock—	
Rounds and hexagons	3.60c.
Squares and flats	4.10c.
Bands	3.25c.
Hoops	4.25c.
Black sheets (No. 24), 25 or more bundles	3.80c. to 3.90c.
Galv. sheets (No. 24), 25 or more bundles	4.45c. to 4.55c.
Light plates, blue annealed (No. 10), 1 to 24 plates	3.35c. to 3.45c.
Blue annealed sheets (No. 13), 1 to 24 sheets	3.50c. to 3.60c.
Galv. corrug. sheets (No. 28), per square	$4.43
Spikes, large	3.40c.
Small	3.80c. to 5.25c.
Boat	3.80c.
Track bolts, all sizes, per 100 count,	60 per cent off list
Machine bolts, 100 count,	60 per cent off list
Carriage bolts, 100 count,	60 per cent off list
Nuts, all styles, 100 count,	60 per cent off list
Large rivets, base per 100 lb.	$3.50
Wire, black soft, ann'l'd, base per 100 lb	$3.00 to 3.10
Wire, galv. soft, base per 100 lb.	3.00 to 3.10
Common wire nails, per keg	2.90 to 3.00
Cement coated nails, per keg	3.05

Semi-Finished Steel, Raw Materials, Bolts and Rivets

Mill Prices of Semi-Finished Steel

Billets and Blooms

	Per Gross Ton
Rerolling, 4-in. and under 10 in., Pittsburgh	$35.00
Rerolling, 4-in. and under 10 in., Youngstown	35.00
Rerolling, 4-in. and under 10 in., Cleveland	35.00
Rerolling, 4-in. and under 10 in., Chicago	37.00
Forging quality, Pittsburgh	$40.00 to 41.00

Sheet Bars

(Open Hearth or Bessemer)

	Per Gross Ton
Pittsburgh	$35.00
Youngstown	35.00
Cleveland	35.00

Slabs

(8 in. x 2 in. and under 10 in. x 10 in.)

	Per Gross Ton
Pittsburgh	$35.00
Youngstown	35.00
Cleveland	35.00

Skelp

(F.o.b. Pittsburgh or Youngstown)

	Per Lb.
Grooved	1.85c. to 1.90c.
Universal	1.85c. to 1.90c.
Sheared	1.85c. to 1.90c.

Wire Rods

(Common soft, base)

	Per Gross Ton
Pittsburgh	$42.00
Cleveland	42.00
Chicago	43.00

Prices of Raw Material

Ores

Lake Superior Ores, Delivered Lower Lake Ports

	Per Gross Ton
Old range Bessemer, 51.50% iron	$4.80
Old range non-Bessemer, 51.50% iron	4.65
Mesabi Bessemer, 51.50% iron	4.65
Mesabi non-Bessemer, 51.50% iron	4.50
High phosphorus, 51.50% iron	4.40

Foreign Ore, c.i.f. Philadelphia or Baltimore

	Per Unit
Iron ore, low phos., copper free, 55 to 58% iron in dry Spanish or Algerian	12.00c.
Iron ore, low phos., Swedish, average 68% iron	12.50c.
Iron ore, basis Swedish, average 65% iron	11.00c.
Manganese ore, washed, 52% manganese, from the Caucasus	32.00c. to 33.00c.
Manganese ore, Brazilian, African or Indian, basic 50%	33.00c.
Tungsten ore, high grade, per unit, in 60% concentrates	$16.25 to $16.50
	Per Gross Ton
Chrome ore, 45 to 50% Cr_2O_3, crude, c.i.f. Atlantic seaboard	$22.00 to $24.00
	Per Lb.
Molybdenum ore, 85% concentrates of MoS_2, delivered	50c. to 55c.

Coke

	Per Net Ton
Furnace, f.o.b. Connellsville prompt	$2.65 to $2.75
Foundry, f.o.b. Connellsville prompt	3.75 to 4.75
Foundry, by-product, Ch'go ovens	8.00
Foundry, by-product, New England, del'd	11.00
Foundry, by-product, Newark or Jersey City, delivered	9.00 to 9.40
Foundry, by-product, Phila.	9.00
Foundry, Birmingham	5.00
Foundry, by-product, St. Louis, f.o.b. ovens	8.00
Foundry by-prod., del'd St. Louis	9.00

Coal

	Per Net Ton
Mine run steam coal, f.o.b. W. Pa. mines	$1.25 to $1.75
Mine run coking coal, f.o.b. W. Pa. mines	1.50 to 1.75
Gas coal, ¾-in. f.o.b. Pa. mines	1.90 to 2.00
Mine run gas coal, f.o.b. Pa. mines	1.65 to 1.75
Steam slack, f.o.b. W. Pa. mines	80c. to 90c.
Gas slack, f.o.b. W. Pa. mines	1.00 to 1.10

Ferromanganese

	Per Gross Ton
Domestic, 80%, seaboard	$105.00
Foreign, 80%, Atlantic or Gulf port, duty paid	105.00

Spiegeleisen

	Per Gross Ton Furnace
Domestic, 19 to 21%	$31.00 to $34.00
Domestic, 16 to 19%	29.00 to 32.00

Electric Ferrosilicon

	Per Gross Ton Delivered
50%	$83.50
75%	130.00

	Per Gross Ton Furnace		Per Gross Ton Furnace
10%	$35.00	12%	$39.00
11%	37.00	14 to 16%	45.00

Bessemer Ferrosilicon

F.o.b. Jackson County, Ohio, Furnace

	Per Gross Ton		Per Gross Ton
10%	$30.00	12%	$34.00
11%	32.00		

Silvery Iron

F.o.b. Jackson County, Ohio, Furnace

	Per Gross Ton		Per Gross Ton
6%	$23.00	10%	$27.00 to $28.00
7%	24.00	11%	29.00 to 30.00
8%	25.00	12%	31.00 to 32.00
9%	26.00		

Other Ferroalloys

Ferrotungsten, per lb. contained metal del'd	$1.40 to $1.50
Ferrochromium, 4 to 6% carbon and up, 65 to 70% Cr., per lb. contained Cr. delivered, in carloads	11.00c.
Ferrovanadium, per lb. contained vanadium, f.o.b. furnace	$3.15 to $3.65
Ferrocarbontitanium, 15 to 18%, per net ton, f.o.b. furnace, in carloads	$160.00
Ferrophosphorus, electric or blast furnace material, in carloads, 18%, Rockdale, Tenn., base, per gross ton	$91.00
Ferrophosphorus, electric 24%, f.o.b. Anniston, Ala., per gross ton	$122.50

Fluxes and Refractories

Fluorspar

	Per Net Ton
Domestic, 85% and over calcium fluoride, not over 5% silicon, gravel, f.o.b. Illinois and Kentucky mines	$18.00
No. 2 lump, Illinois and Kentucky mines	20.00
Foreign, 85% calcium fluoride, not over 5% silica, c.i.f. Atlantic port, duty paid	$18.25 to $18.75
Domestic, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2½% silica, f.o.b. Illinois and Kentucky mines	32.50

Fire Clay Brick

	Per 1000 f.o.b. Works	
	High-Heat Duty Brick	Intermediate Heavy Duty Brick
Pennsylvania	$43.00 to $46.00	$35.00 to $38.00
Maryland	43.00 to 46.00	35.00 to 38.00
New Jersey	50.00 to 65.00	.....
Ohio	43.00 to 46.00	35.00 to 38.00
Kentucky	43.00 to 46.00	35.00 to 38.00
Missouri	43.00 to 46.00	35.00 to 38.00
Illinois	43.00 to 46.00	35.00 to 38.00
Ground fire clay, per ton	7.00	

Silica Brick

	Per 1000 f.o.b. Works
Pennsylvania	$43.00
Chicago	52.00
Birmingham	50.00
Silica clay, per ton	$8.50 to 10.00

Magnesite Brick

	Per Net Ton
Standard sizes, f.o.b. Baltimore and Chester, Pa.	$65.00
Grain magnesite, f.o.b. Baltimore and Chester, Pa.	40.00
Standard size	45.00

Chrome Brick

	Per Net Ton
Standard size	$45.00

Mill Prices of Bolts, Nuts, Rivets and Set Screws

Bolts and Nuts

Per 100 Pieces

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

	Per Cent Off List
†Machine bolts	70
†Carriage bolts	70
Lag bolts	70
Plow bolts, Nos. 1, 2, 3 and 7 heads	70
Hot-pressed nuts, blank or tapped, square	70
Hot-pressed nuts, blank or tapped, hexagons	70
C.p.c. and t. square or hex. nuts, blank or tapped	70
Washers*	7.00c. to 6.75c. per lb. off list

*F.o.b. Chicago, New York and Pittsburgh.

†Bolts with rolled thread up to and including ⅛ in. x 6 in. take 10 per cent lower list prices.

Bolts and Nuts

	Per Cent Off List
Semi-finished hexagons nuts	70
Semi-finished hexagons castellated nuts, S.A.E.	70
Stove bolts in packages, P'gh	75, 20, 10 and 5
Stove bolts in packages, Chicago	75, 20, 10 and 5
Stove bolts in packages, Cleveland	75, 20, 10 and 5
Stove bolts in bulk, P'gh	75, 20, 10, 5 and 2½
Stove bolts in bulk, Chicago	75, 20, 10, 5 and 2½
Stove bolts in bulk, Cleveland	75, 20, 10, 5 and 2½
Tire bolts	60, 5 and 5

Discounts of 70 per cent off on bolts and nuts applied on carload business. For less than carload orders discounts of 55, 60 per cent apply.

Large Rivets

(½-In. and Larger)

	Base per 100 Lb.
F.o.b. Pittsburgh or Cleveland	$3.10
F.o.b. Chicago	3.20

Small Rivets

(⅞-In. and Smaller)

	Per Cent Off List
F.o.b. Pittsburgh	70 and 10
F.o.b. Cleveland	70 and 10
F.o.b. Chicago	70 and 10

Cap and Set Screws

(Freight allowed up to but not exceeding 50c. per 100 lb. on lots of 200 lb. or more)

	Per Cent Off List
Milled cap screws	80, 10 and 5
Milled standard set screws, case hardened	80 and 5
Milled headless set screws, cut thread	75 and 10
Upset hex. head cap screws, U.S.S. thread	85
Upset hex. cap screws, S.A.E. thread	85
Upset set screws	80, 10 and 5
Milled studs	70

Chicago

Steel Production Down to 88 Per Cent—Freight Car and Rail Inquiries Lead in Prospective Business

CHICAGO, Sept. 17.—Interest in this market continues to center in rapid moves being made by the railroads. The Santa Fe is making known that it will buy 5754 freight cars and the Southern will purchase 2000 cars. The superstructures for these cars will take close to 115,000 tons of steel. No less impressive is the standard-section rail market, which this week has brought 50,000 tons additional to Western makers' books, and fresh inquiry for 100,000 tons.

Concurrent with this brighter side of the steel trade comes the announcement of the banking of No. 3 furnace at South Chicago Works. The leading producer now is using 17 of 27 stacks, a loss of three in two weeks, and ingot output for the district as a whole is not above 88 per cent of capacity.

New buying in finished steel is dragging, not so much because of absence of interest on the part of buyers but because of lack of accord among producers as to the proper time for announcing fourth quarter prices. The Inland Steel Co. has taken the lead and has named 2.05c. a lb. for plates, shapes and bars.

Forward contracting in wire is making progress at current prices, but quotations for wire nails are weak and new business is dull. Attempts to bolster sheet prices are not meeting with full success, especially when delivery points are to the south and west of Chicago.

The suspension of a large pipe contract is still in effect. Deliveries on most sizes of plates range from three to four weeks, or better if orders match rolling schedules.

There is no evidence here that semi-finished steel is being accumulated at mills, which at the moment are closely balancing output with shipments.

Ferroalloys. — Several carloads of ferromanganese have been sold at $105 a ton, seaboard. The spiegeleisen market is quiet except from the viewpoint of shipments, which are being maintained at a uniform rate.

Prices delivered Chicago: 80 per cent ferromanganese, $112.56; 50 per cent ferrosilicon, $83.50 to $88.50; spiegeleisen, 19 to 21 per cent, $39.76 to $41.76.

Pig Iron. — Prices for Northern foundry iron are firm at $20 a ton, local furnace, as buying mounts to sizable tonnages for delivery in the fourth quarter. All merchant furnaces but one, Iroquois No. 5, are lighted, and its operators plan to put this one in service about the first of next month. Reports received here are to the effect that several light car manufacturers are curtailing output. On the other hand, one builder, just now swinging into production on new models, is ordering much larger quantities of pig iron. Southern iron is quotable at $13 to $13.50 a ton, Birmingham. Efforts are being made to establish the market at the upper figure, but outstanding quotations at $13 are delaying this move. The silvery market is drifting slowly in the matter of sales, but shipping orders are fully equal to the average in recent weeks. Shipments of Northern iron are running 10 per cent heavier than in the corresponding period of last year.

Prices per gross ton at Chicago:

N'th'n No. 2 fdy., sil. 1.75 to 2.25	$20.00
N'th'n No. 1 fdy., sil. 2.25 to 2.75	20.50
Malleable, not over 2.25 sil.	20.00
High phosphorus	20.00
Lake Super. charcoal, sil. 1.50	27.04
So'th'n No. 2 fdy. (all rail)	$18.51 to 19.01
Low phos., sil. 1 to 2, copper free	23.50
Silvery, sil. 8 per cent	29.79
Bess. ferrosilicon, 14-15 per cent	46.29

Prices are delivered consumers' yards except on Northern foundry, high phosphorus and malleable, which are f.o.b. local furnace, not including an average switching charge of 61c. per gross ton.

Sheets.—New business is moderately active, and Western makers' backlogs are growing slowly. Irregularities are still noted in prices, though one local producer is attempting to hold rigidly to 3.05c. a lb., Chicago, for black sheets, 3.75c. for the galvanized product, and 2.35c. for No. 10 gage blue annealed sheets. Lower prices than these prevail on tonnages bought for shipment south of Chicago. Deliveries of heavy gages of blue annealed sheets are extended beyond 12 weeks, and much business in this grade is being diverted to other producing centers. Galvanized sheets may be had in four to five weeks, and the tendency of deliveries is to be still further deferred. Several large inquiries are now before the trade from jobbers. Output has reached 95 per cept of capacity following a free supply of sheet bars.

Base Prices per lb., deliv'd from mill in Chicago: No. 24 black sheets, 3c. to 3.05c.; No. 24 galv., 3.65c. to 3.75c.; No. 10 blue ann'l'd, 2.35c. Deliv'd prices at other Western points are equal to the freight from Gary, plus the mill prices, which are 5c. per 100 lb. lower than Chicago delivered prices.

Rails and Track Supplies.—A Western railroad has ordered 50,000 tons of standard-section rails with which there will be required close to 12,000 tons of track supplies. This order is for rolling this fall and the sellers expect that releases will be forthcoming in two to three weeks. In the meantime, Chicago rail mills continue to operate at unchanged schedules on past orders. No word has been received here as to the disposition of the rails for the Chesapeake & Ohio. Fresh inquiry before Chicago mills by two Western railroads totals 100,000 tons. Shipping schedules now being arranged against new orders show that the railroads are willing to take fall deliveries at a faster rate than has been their custom in recent years. Local track accessory departments are engaged at 75 per cent of capacity. Miscellaneous orders for light rails aggregate only a few hundred tons.

Prices f.o.b. mill, per gross ton: Standard section open-hearth and Bess. rails, $43; light rails, rolled from billets, $36. *Per lb.:* Standard railroad spikes, 2.80c.; track bolts with square nuts, 3.80c.; steel tie plates, 2.15c.; angle bars, 2.75c.

Cast Iron Pipe.—This cast iron pipe market continues to mark time, with few indications that an improvement can be expected at an early date. Milwaukee will open bids Sept. 24 on 200 tons of 8-in. and 300 tons of 12-in. pipe. Several inquiries are taking shape, each of about 200 tons, and several contractors give promise of having pipe to buy before the end of the month. A few odd tonnages are being sought by railroads and industrial plants. Deliveries are prompt on most sizes, and prices are stable at $45.20 to $46.20 a ton, delivered, Chicago, for diameters 6 in. and larger.

Prices per net ton, del'd Chicago: Water pipe, 6-in. and over, $45.20 to $46.20; 4-in., $49.20 to $50.20; Class A and gas pipe, $3 extra.

Reinforcing Bars. — Awards total more than 1000 tons, about equal to the lettings of the preceding week. The character of recent buying is well diversified, representing new industrial activity, a large apartment building and business structures. Litigation now threatens to hold in check Illinois road work, which was to have been financed by the new gasoline tax. Fresh inquiry is in moderate volume, the bulk of it, however, for small projects. Prices remain in the unstable condition of recent months. Some sellers of rail steel reinforcing bars are making another attempt to establish 1.95c. a lb., Chicago Heights, as the minimum. Mill deliveries are improved.

Wire Products.—New contracting in these products is in fair volume, especially from jobbing and retail buyers. Stocks at mills are in good condition for the fall trade, and wire mill output has been cut to 60 per cent of capacity, which conforms with current shipments. The price situation is unaltered from that of a week ago, with quotations steady on wire but weak on nails. Wire nails are commonly quoted at $2.50 to $2.60, base, per 100-lb. keg, delivered Chicago. Demand for woven wire fencing is slowly expanding.

Cold-Rolled Strips. — Specifications are shrinking in volume as several manufacturers of low-priced motor cars continue to whittle down production programs. Output for the country as a whole averages close to 50 per cent of capacity.

Plates.—New orders for oil storage tanks call for 8000 tons of steel plates, 6500 tons of which will be supplied by makers east of Chicago. The 1500 tons purchased from local mills will be sent to Oklahoma, where it will be fabricated. These orders were placed by five oil refiners, and the bulk of the tonnage is for erection in Texas. Fresh inquiry comes in one lot from

the Southwest and is for 4000 tons, which added to old inquiry makes a total of about 14,000 tons of tankage plates that is now before the trade. Also of interest this week is an inquiry for 4000 tons of steel by a Lake Michigan shipbuilder. Part suspension in the output of welded steel pipe is still in effect. The contract covering a large new project is still valid and it is generally thought here that output as originally planned will be resumed at an early date. The outlook in the railroad equipment market seems to be improved since a week ago. Plans are rapidly taking shape to put into shops 1000 cars recently ordered by the St. Paul. Releases for steel are expected in about three weeks. These cars are of unusually heavy construction and each superstructure will take 16 tons of steel. The Chicago & Eastern Illinois is still undecided whether it will build in its own shops or will award a contract for 500 gondola bodies. The Southern is in the market for 1000 box cars and 1000 gondolas. Information gathered by sellers of steel indicates that Western railroads will seek prices in the next week on 5000 cars. New buying in plates is quiet in the absence of general accord among producers as to the proper time for the announcement of fourth quarter prices. The Inland Steel Co. is today reaffirming the present quotations, but no announcement has come from the leading producer.

Structural Material. — Structural awards for the week totaled more than 10,000 tons, of which 5000 tons is for 1929 and 1930 bridge construction work for the Great Northern. A garage in Chicago calls for 2500 tons, and highway bridge work in Oklahoma accounts for 2000 tons. Fresh inquiries total close to 5000 tons. Plans will soon be ready for a 1600-ton office building in Milwaukee. A packing plant in St. Louis will take 900 tons, and highway bridges in Lake County, Ind., will require a like tonnage. A theater at Fort Wayne, Ind., swells the list by 700 tons. New bids are being submitted on the 4800 tons needed for the Phillips School, Chicago. It is reported that bids will be opened Sept. 24. Lettings during the week have been decidedly in favor of large fabricators. Although there is a fair amount of light tonnage work before small shops, it is not coming out rapidly enough to check the shrinkage of order books. The Inland Steel Co. has named 2.05c. a lb., Chicago, as its fourth quarter contract price.

Mill prices on plain material, per lb.: 2.05c. base, Chicago.

Bars. — Current specifications for mild steel bars reflect steady consumption. Activity among manufacturers of road machinery is spotty, with several plants at Milwaukee having made recent sharp reductions in output. Farm implement makers have hit an even stride except in production of heavy tractors and combines. Improvement, however, is said to be in sight as farm machinery manufacturers lay plans for heavier consumption of steel during the fall months for the production of equipment that will be needed for spring delivery. Further improvement is noted in demand from automobile parts makers. The change, however, is slight. Announcements as to fourth quarter prices are slow in being made. The Inland Steel Co. alone is making known to its trade that mild steel bars for delivery in the next three months will be priced at 2.05c. a lb., Chicago. Contracting for alloy steel bars is progressing satisfactorily, and backlogs are growing. Specifications are expanding, and deliveries are tending to go beyond the two weeks' point. The iron bar market is quiet, except for scattered spot sales of small individual tonnages. Specifications for rail steel bars are measurably larger from the bed manufacturing trade and makers of barn equipment. A fair part of fourth quarter contracts is under cover, and prices are well established at 1.95c. a lb., Chicago Heights. Specifications are larger than shipments, and hours of rolling have been extended.

Bolts, Nuts and Rivets.—Forward contracting is making rapid strides. Prices are well established. Current specifications continue to run only in fair volume, but indications are at hand that shipments will grow in October.

Coke. — Shipments of by-product foundry coke are well sustained at the rate of the opening week in September. Spot sales at $8 a ton, local ovens, are few in number and widely scattered.

Old Material.—The Chicago scrap market is dull. Heavy melting steel is nominally quoted at $15 to $15.50 a gross ton, delivered. Although some users are taking this grade in excess of immediate needs, this being an effort to expand reserves on hand. Supplies are more than ample as gaged by mill operations at 88 per cent of capacity. Brokers are covering orders at 25c. lower than a week ago. Demand for hydraulic bundles is unusually quiet, and one broker, who is usually very active in this grade, is without a large order for the first time in many months. Rerolling rails are in light demand, and prices have dropped 25c. a ton. Among lists offered this week are 4000 tons by the Rock Island, 2000 tons by the Grand Trunk, a small extra list by the St. Paul and lists from various plants of the General Motors Corporation.

Prices deliv'd Chicago district consumers:

Per Gross Ton

Basic Open-Hearth Grades:	
Heavy melting steel	$15.00 to $15.50
Shoveling steel	15.00 to 15.50
Frogs, switches and guards, cut apart, and misc. rails	16.75 to 17.25
Hydraul. compressed sheets	13.50 to 14.00
Drop forge flashings	10.75 to 11.25
No. 1 busheling	13.25 to 13.75
Forg'd cast and r'l'd steel carwheels	18.75 to 19.25
Railroad tires, charg. box size	18.75 to 19.25
Railroad leaf springs cut apart	18.75 to 19.25
Acid Open-Hearth Grades:	
Steel couplers and knuckles	17.00 to 17.50
Coil springs	19.00 to 19.50
Electric Furnace Grades:	
Axle turnings	14.50 to 15.00
Low phos. punchings	17.00 to 17.50
Low phos. plates, 12 in. and under	17.00 to 17.50
Blast Furnace Grades:	
Axle turnings	13.00 to 13.50
Cast iron borings	10.50 to 11.00
Short shoveling turnings	10.50 to 11.00
Machine shop turnings	7.50 to 8.00
Rolling Mill Grades:	
Iron rails	16.00 to 16.50
Rerolling rails	17.75 to 18.25
Cupola Grades:	
Steel rails less than 3 ft.	17.50 to 18.50
Steel rails less than 2 ft.	20.00 to 20.50
Angle bars, steel	17.00 to 17.50
Cast iron carwheels	14.00 to 14.50
Malleable Grades:	
Railroad	17.00 to 17.50
Agricultural	15.50 to 16.00
Miscellaneous:	
*Relaying rails, 56 to 60 lb.	23.00 to 25.00
*Relaying rails, 65 lb. and heav.	26.00 to 31.00

Per Net Ton

Rolling Mill Grades:	
Iron angle and splice bars	15.00 to 15.50
Iron arch bars and transoms	21.00 to 21.50
Iron car axles	26.50 to 27.00
Steel car axles	17.50 to 18.00
No. 1 railroad wrought	14.00 to 14.50
No. 2 railroad wrought	13.50 to 14.00
No. 1 busheling	9.00 to 9.50
No. 2 busheling	7.00 to 7.50
Locomotive tires, smooth	14.50 to 15.00
Pipes and flues	10.00 to 10.50
Cupola Grades:	
No. 1 machinery cast	14.50 to 15.00
No. 1 railroad cast	14.00 to 14.50
No. 1 agricultural cast	13.25 to 13.75
Stove plates	12.25 to 12.75
Grate bars	11.75 to 12.25
Brake shoes	11.50 to 12.00

*Relaying rails, including angle bars to match, are quoted f.o.b. dealers' yards.

Warehouse Prices, f.o.b. Chicago

	Base per Lb.
Plates and structural shapes	3.10c.
Soft steel bars	3.00c.
Reinforc'g bars, billet steel	2.10c. to 2.35c.
Reinforc'g bars, rail steel	1.85c. to 1.95c.
Cold-fin. steel bars and shafting—	
Rounds and hexagons	3.60c.
Flats and squares	4.10c.
Bands (⅞ in. in Nos. 10 and 12 gages)	3.20c.
Hoops (No. 14 gage and lighter)	3.75c.
Black sheets (No. 24)	4.05c.
Galv. sheets (No. 24)	4.90c.
Blue ann'l'd sheets (No. 10)	3.35c.
Spikes, ⅝ in. and larger	3.55c.
Track bolts	4.55c.
Rivets, structural	4.00c.
Rivets, boiler	4.00c.
	Per Cent Off List
Machine bolts	60
Carriage bolts	60
Coach or lag screws	60
Hot-pressed nuts, sq., tap. or blank	60
Hot-pressed nuts, hex., tap. or blank	60
No. 8 black ann'l'd wire, per 100 lb.	$3.45
Com. wire nails, base per keg	3.20
Cement c't'd nails, base per keg	3.20

Pheoll Mfg. Co. of Minnesota, a subsidiary of the Pheoll Mfg. Co., Chicago, will take over and operate as a direct warehouse and sales office the bolt, nut and screw business formerly conducted by the Irvine Brass & Copper Co., Minneapolis. This office and warehouse will be situated in the Winston-Harper-Fisher Building, 405 Second Avenue North.

Improvements to be made at the Rankin Works of the American Steel & Wire Co., Rankin, Pa., include the installation of eight 300-hp. 167-r.p.m. motors and two 1000-kva. transformers. An order for this equipment, together with an outdoor substation, has been placed with the General Electric Co.

New York

Pig Iron Sales 26,000 Tons—Building Will Take 40,000 Tons of Structural Steel

NEW YORK, Sept. 17.—Pig iron sales last week were heavy, totaling 26,000 tons. The largest individual purchase was 15,000 tons, representing the fourth quarter requirements of the Bayonne, N. J., radiator plant. The Richmond Radiator Co. has partly closed against its inquiry for 5000 tons for Uniontown, Pa., but has postponed action on most of the tonnage. A large part of current business is made of relatively small lots placed quietly. Most melters are conservative in buying, but are covering, or have covered, for part of their fourth quarter needs. Foundry operations are reported as increasingly spotty in nearby New England, but are well sustained on the average, although the outlook for the remainder of the year is somewhat uncertain. Some makers of heating equipment are experiencing a seasonal pickup in activity, but most of them still have large inventories to work off. Judging by business booked thus far in the current week, with one seller reporting orders for 1500 tons and another for 1000 tons, pig iron demand is keeping up at a fair rate. Developments in prices are in the direction of greater stability. Alabama furnaces are now quoting $13.50, base, Birmingham, on foundry iron, and the lowest price reported in the past week was $13. Buffalo furnaces are less aggressive and are more generally holding at $18, base, although quotations of $17.50, furnace, have not disappeared. Eastern Pennsylvania producers have been most active in soliciting recent business in northern New Jersey and have quoted $18.50, base, furnace, on attractive tonnages. The Port Henry, N. Y., furnace is still out for repairs and the Mystic furnace at Everett, Mass., may also be put out for relining.

Prices per gross ton, delivered New York district:

Buffalo No. 2 fdy., sil. 1.75 to 2.25	$22.41 to $22.91
*Buf. No. 2, del'd east. N. J.	20.78 to 21.28
East. Pa. No. 2 fdy., sil. 1.75 to 2.25	19.89 to 21.02
East. Pa. No. 2X fdy., sil. 2.25 to 2.75	20.39 to 21.52

Freight rates: $4.91 from Buffalo, $1.39 to $2.52 from eastern Pennsylvania.
*Prices delivered to New Jersey cities having rate of $3.28 a ton from Buffalo.

Warehouse Business.—Buying is limited to small lots. Demand for structural steel has not yet developed to the usual fall proportions. Black, galvanized and blue annealed sheets are quiet and prices are still subject to concessions of $1 to $2 on black and galvanized and $2 and more on blue annealed.

Cast Iron Pipe.—Inquiries for pressure pipe are almost entirely for carload lots or less, and quotations are unchanged, with Northern foundries quoting $31 to $33, base, f.o.b. plant, and Southern makers quoting $35 to $37 a ton, f.o.b. Birmingham. About 180 tons of 12-in. and 24-in. pipe for Hartford, Conn., was awarded to a Southern maker. A steam company making an installation at the Chevrolet Motor Co. assembly plant in Tarrytown, N. Y., has bought about 200 tons of pipe from the National Cast Iron Pipe Co.

Prices per net ton deliv'd New York: Water pipe, 6-in. and larger, $33.60 to $34.60; 4-in. and 5-in., $36.60 to $37.60; 3-in., $43.60 to $44.60. Class A and gas pipe, $3 extra.

Reinforcing Bars.—Three hundred tons of bars for highway bridges in New Jersey will be supplied by Igoe Brothers. Considerable tonnage for subway work is pending, but no awards will be made until the last week of September or possibly early in October. The volume of small jobs has fallen off somewhat, but mills are reported to be well engaged. Prices are steady and unchanged.

Billet steel reinforcing bars in 40, 50 and 60-ft. lengths, 2.05c. per lb., Pittsburgh, and 2.30c. per lb., Pittsburgh warehouse, for cut lengths. Out of New York warehouse, 2.90c. per lb. for lots of 5 tons or more, 3.05c. for lots of 2 to 5 tons and 3.30c. for less than 2 tons, all delivered at job.

Finished Steel.—A definite trend in steel business is still lacking in the New York territory. Orders received by some companies so far this month are about equal to those booked during the same number of days in August, but, as last month was comparatively light in new buying, steel business is barely holding its own, considering the continued high rate of operations. The leading Eastern producer, which started out the month at a 95 per cent operation, has dropped to around 90 per cent. Output of other Eastern companies has also tapered somewhat, though in some cases production is still running ahead of the volume of incoming business. The week's most significant development is a revival in buying of railroad equipment, with somewhat more promising prospects in the form of inquiries. The Central of Georgia has ordered 1000 cars, but these will be built in the Birmingham district. The Norfolk & Western has contracted with a Virginia company for 1000 steel car bodies. The most important inquiry in the East comes from the Southern Railway, which asks for bids on 2000 cars, but is expected to buy more than that number. In structural steel, the outlook is still good. An outstanding project is the building to be erected on the site of the old Waldorf-Astoria Hotel, Fifth Avenue and Thirty-fourth Street, New York, which will require 40,000 tons of steel. The City of New York has announced preliminary plans for about 100 miles of new subway construction in New York, but it will be some time before the work has got to a point that steel will be called for. In the price situation, the stand that some makers of galvanized sheets have taken for a firm 3.60c., Pittsburgh price, is the principal development. The $2 differential to the jobber is wiped out in many cases. No marked price weakness has appeared other than that in structural steel brought about by keen competition between Eastern and Middle district producers.

Mill prices per lb., deliv'd New York: Soft steel bars, 2.29c.; plates, 2.22½c.; structural shapes, 2.19½c.; bar iron, 2.14c.

Warehouse Prices, f.o.b. New York

	Base per Lb.
Plates and structural shapes	3.30c.
Soft steel bars, small shapes	3.25c.
Iron bars	3.24c.
Iron bars, Swed. charcoal	7.00c. to 7.25c.
Cold-fin. shafting and screw stock—	
Rounds and hexagons	3.60c.
Flats and squares	4.10c.
Cold-roll. strip, soft and quarter hard	5.15c. to 5.40c.
Hoops	4.25c.
Bands	3.75c.
Blue ann'l'd sheets (No. 10)	3.80c. to 3.90c.
Long terne sheets (No. 24)	5.80c.
Standard tool steel	12.00c.
Wire, black annealed	4.50c.
Wire, galv. annealed	5.15c.
Tire steel, 1½ x ½ in. and larger	3.40c.
Smooth finish, 1 to 2½ x ¼ in. and larger	3.75c.
Open-hearth spring steel, bases	4.50c. to 7.00c.

	Per Cent Off List
Machine bolts, cut thread:	
¾ x 6 in. and smaller	60
1 x 30 in. and smaller	50 to 50 and 10
Carriage bolts, cut thread:	
½ x 6 in. and smaller	60
¾ x 20 in. and smaller	50 to 50 and 10
Coach screws:	
½ x 6 in. and smaller	60
1 x 6 in. and smaller	50 to 50 and 10

Boiler Tubes—	Per 100 Ft.
Lap welded, 2-in.	$17.33
Seamless steel, 2-in.	20.24
Charcoal iron, 2-in.	25.00
Charcoal iron, 4-in.	67.00

Discounts on Welded Pipe

Standard Steel—	Black	Galv.
½-in. butt	46	29
¾-in. butt	51	37
1-3-in. butt	53	39
2½-6-in. lap	48	35
7 and 8-in. lap	44	17
11 and 12-in. lap	37	12
Wrought Iron—		
½-in. butt	5	+19
¾-in. butt	11	+ 9
1-1½-in. butt	14	+ 6
2-in. lap	5	+14
3-6-in. lap	11	+ 6
7-12-in. lap	3	+16

Tin Plate (14 x 20 in.)

	Prime	Seconds
Coke, 100 lb. base box	$6.45	$6.20
Charcoal, per Box	A	AAA
IC	$9.70	$12.10
IX	12.00	14.25
IXX	13.90	16.00

Terne Plate (14 x 20 in.)

IC—20-lb. coating	$10.00 to $11.00
IC—30-lb. coating	12.00 to 13.00
IC—40-lb. coating	13.75 to 14.25

Sheets, Box Annealed—Black, C. R. One Pass

	Per Lb.
Nos. 18 to 20	3.75c. to 3.80c.
No. 22	3.90c. to 3.95c.
No. 24	3.95c. to 4.00c.
No. 26	4.05c. to 4.10c.
No. 28*	4.20c. to 4.25c.
No. 30	4.45c. to 4.50c.

Sheets, Galvanized

	Per Lb.
No. 14	4.20c. to 4.40c.
No. 16	4.15c. to 4.25c.
No. 18	4.20c. to 4.40c.
No. 20	4.30c. to 4.50c.
No. 22	4.40c. to 4.60c.
No. 24	4.65c. to 4.75c.
No. 26	4.90c. to 5.00c.
No. 28*	5.15c. to 5.25c.
No. 30	5.55c. to 5.65c.

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

Pipe.—At least three of the leading producers of steel pipe have notified jobbers in New York, as well as in the remainder of the country, that failure to maintain resale prices hereafter may result in the cutting off of sales to such offenders. Other pipe makers will send similar notices to their customers within a few days. Such action follows in tenor that taken several months ago by the two leading makers of wrought iron pipe, the A. M. Byers Co. and the Reading Iron Co. While the announcement by the steel pipe producers applies to the entire country, it is the situation in New York particularly which has brought it about. It is stated that the failure of some pipe jobbers, including a number who receive consigned stocks, to maintain any semblance of price stability has unsettled the entire market to such an extent that none can obtain profitable prices. The action of the mills is said to have been urged by some of the jobbers whose business success is threatened by inability to obtain a profit on the pipe they sell.

Coke.—All grades are quiet. Furnace coke is unchanged at $2.75 to $2.80 a net ton, Connellsville. Special brands of beehive foundry coke are quoted at $4.85 a net ton, ovens, or $8.56, delivered to northern New Jersey, Jersey City and Newark, and $9.44 to New York and Brooklyn. By-product coke is quoted at $9 to $9.40 a net ton, Newark or Jersey City, and $10.06, New York or Brooklyn.

Old Material. — Supplies of all grades of scrap are plentiful and, with eastern Pennsylvania consumers in some instances asking delays in deliveries on contracts, brokers are able to buy No. 1 heavy melting steel at $16 a ton, delivered, and No. 2 steel at $13.50 to $14.25 a ton, delivered. Sizable tonnages of No. 2 heavy melting steel are still moving to the consumer at Bethlehem, Pa. Cast scrap is inactive and prices depressed.

Dealers' buying prices per gross ton, f.o.b. New York:

No. 1 heavy melting steel	$12.50 to $13.25
Heavy melting steel (yard)	8.00 to 10.00
No. 1 hvy. breakable cast.	10.25 to 11.50
Stove plate (steel works).	8.00 to 8.25
Locomotive grate bars....	8.25 to 8.75
Machine shop turnings....	7.75 to 8.00
Short shoveling turnings..	8.00 to 8.50
Cast borings (blast furn. or steel works).....	7.00 to 7.75
Mixed borings and turnings	6.75 to 7.75
Steel car axles.....	19.50 to 20.00
Iron car axles.....	23.00 to 24.00
Iron and steel pipe (1 in. dia., not under 2 ft. long)	10.75
Forge fire	9.75 to 10.25
No. 1 railroad wrought...	12.00 to 12.50
No. 1 yard wrought, long..	11.00 to 11.50
Rails for rolling.....	13.25 to 13.75
Stove plate (foundry)....	8.00 to 8.50
Malleable cast (railroad).	14.00 to 14.50
Cast borings (chemical)..	10.00 to 10.50

Prices per gross ton, deliv'd local foundries:

No. 1 machry. cast.....	$16.50
No. 1 hvy. cast (columns, bldg. materials, etc.), cupola size.....	14.50
No. 2 cast (radiators, cast boilers, etc.)	14.00

U. S. Metal Products Co., sheet metal jobber, specializing in mill surpluses and seconds, has moved to a new warehouse at 2300 West Fifty-eighth Street, Chicago, where 40,000 sq. ft. of floor space will be utilized for steel storage.

Cleveland

Orders for Finished Steel Decline—Mills Need Business in Some Lines—Automotive Demand Unimproved

CLEVELAND, Sept. 17.—The demand for finished steel declined the past week and backlogs were further reduced. The slackening is due to the restricted demand from the automotive industry. The trend of production in that industry still appears to be downward, the increase in schedules by some motor car manufacturers on new models being more than offset by curtailment by others. It is reported that the Ford Motor Co. has reduced its production schedules considerably and that its September output will be much below its August peak of 205,000 cars. Some of the motor car builders that brought out new models are getting under production slower than had been expected, evidently waiting until their stocks of old cars have been cleaned up or until they can make some gage of the extent of fall buying.

With additional announcements of reestablishment of third quarter prices made during the week, practically all current prices have been named for the last quarter. Alloy steel bars will remain at the present 2.65c. base. Wire nails have been reestablished at the current prices which represent a decline from those ruling at the start of the present quarter. Wire rods have been reaffirmed at $42, Cleveland and Pittsburgh, at which a few contracts have been closed. Some mills are quoting cold-rolled strip at 2.75c. to the larger buyers for the last quarter, which indicates that attempts to get the price back to 2.85c. will not succeed except possibly on small-lot business. Practically no interest in last quarter contracts is being shown by consumers and few mills are soliciting contracts. The automotive industry is following a hand-to-mouth policy in buying for current needs. Products for which some of the mills now are in need of orders include steel bars, hot and cold-rolled strip and sheets.

Semi-Finished Steel.—A local mill is naming for the fourth quarter its present price of $35, Cleveland, Youngstown and Pittsburgh, for sheet bars, billets and slabs and expects to close some of its trade this week at the reaffirmed prices. Specifications are holding up well, and this mill is operating 13 of its 14 open-hearth furnaces. Wire rods have been reestablished for the fourth quarter at $42, Cleveland and Pittsburgh, and some business has been taken for that delivery.

Pig Iron.—Buying for the fourth quarter continues at a moderate rate. Sales totaling 23,600 tons in foundry and malleable iron were made by Cleveland interests during the week, or slightly more than during the previous week. Shipments during the first half of September show a slight gain over the corresponding period of August. The automotive industry is taking a little more iron than last month. Consumers as yet are showing no interest in first quarter contracts, although some furnaces probably would be willing to sell for that delivery at current prices. The market is firm and producers see no possibility of lower prices unless steel plant operations should slow down to an extent that steel plants will have surplus iron for sale. One local producer is still out of the market because of the heavy demands of its steel plant. Prices are unchanged at $18.50, Cleveland, for outside shipment, and $19, furnace, for local delivery. In Michigan, the market is firm at $20 for both foundry and malleable grades. Southern foundry iron is holding in this territory at the recent advance in prices. A few small lots were sold during the week at $14, Birmingham.

Prices per gross ton at Cleveland:

N'th'n fdy., sil. 1.75 to 2.25	$19.50
S'th'n fdy., 1.75 to 2.25...	$19.50 to 20.00
Malleable	19.50
Ohio silvery, 8 per cent...	28.00
Basic Valley furnace.....	18.50
Stand. low phos., Valley..	26.50 to 27.00

Prices except on basic and low phosphorus are delivered Cleveland. Freight rates: 50c. from local furnaces; $3 from Jackson, Ohio; $6 from Birmingham.

Bars, Plates and Shapes.—Demand for steel bars is rather slow, owing to curtailment of the automotive industry, and some of the mills now need orders. Plates are moving fairly well in small lots. Structural inquiry is fair. Inquiries are out for an Akron, Ohio, department store requiring 3000 tons and for grade crossing work in Cleveland that will take 1000 tons. Although present quoted prices have been named for the last quarter, few contracts have been written. Steel bars are quoted at 1.90c. to 1.95c., Cleveland, outside mills holding to the higher price. Plates and structural shapes are quoted at 1.95c., Pittsburgh.

Warehouse Prices, f.o.b. Cleveland

	Base per Lb.
Plates and struc. shapes.....	3.00c.
Soft steel bars	3.00c.
Reinforc. steel bars.....2.25c. to	2.50c.
Cold-fin. rounds and hex.....	3.65c.
Cold-fin. flats and sq.....	4.15c.
Hoops and bands, No. 12 to ¼ in., inclusive	3.25c.
Hoops and bands, No. 13 and lighter	3.65c.
Cold-finished strip.....*5.95c.	
Black sheets (No. 24).....3.70c. to	3.90c.
Galvanized sheets (No. 24).4.60c. to	4.75c.
Blue ann'l'd sheets (No. 10).....	3.25c.
No. 9 ann'l'd wire, per 100 lb.....	$2.90
No. 9 gal. wire, per 100 lb.....	3.35
Com. wire nails, base per keg.....	2.90

*Net base, including boxing and cutting to length.

Sheets.—Practically all producers have reaffirmed present prices for the fourth quarter, but few consumers are showing interest in contracts. Specifications showed a further tapering tendency the past week and most mills need tonnage on some grades, although two or three are still well booked for five or six weeks. The expected pickup in the demand for the automotive industry has not yet developed. Prices appear to be well maintained at 2.85c., Pittsburgh, for black, 2.35c. for blue annealed, 2.20c. for light blue annealed plates and 3.60c. for galvanized, although there are occasional reports of a shading of the latter. Wire products' manufacturers will continue present prices through the fourth quarter, but do not expect to close many contracts in the near future because consumers still have considerable wire tonnage due on present contracts and also because of the existing price irregularity on nails. Wire is firm at 2.40c. to 2.50c., Cleveland, and a few contracts for manufacturers' wire have been closed at the higher figure. The rather common range on wire nails is $2.45 to $2.55 a keg, Cleveland.

Old Material. — The market is weaker. The supply has become more plentiful and the demand is light. Some dealers having outstanding mill contracts have temporarily withdrawn from the market with the expectation that prices will go lower. Shoveling steel turnings have declined 50c. a ton and blast furnace scrap 25c. a ton, $10.50 now being the maximum price for the latter and at which some sales are reported. Hydraulic bundles brought $17.75 late in the week for a 1000-ton lot in a transaction between dealers for Youngstown delivery, but probably not above $17.50 would now be paid.

Prices per gross ton delivered consumers' yards:

Basic Open-Hearth Grades:	
No. 1 heavy melting steel	$15.25 to $15.50
No. 2 heavy melting steel	14.75 to 15.00
Compressed sheet steel	15.50 to 16.00
Light bundled sheet stampings	12.00 to 12.50
Drop forge flashings	13.00 to 13.25
Machine shop turnings	9.75 to 10.25
Short shoveling turnings	11.25 to 11.75
No. 1 railroad wrought	13.50 to 14.00
No. 2 railroad wrought	16.00 to 16.50
No. 1 busheling	13.25 to 13.75
Pipes and flues	9.00 to 9.50
Steel axle turnings	12.50 to 13.00
Acid Open-Hearth Grades:	
Low phos., forging crops	17.75 to 18.00
Low phos., billet, bloom and slab crops	18.50 to 18.75
Low phos., sheet bar crops	18.00 to 18.50
Low phos., plate scrap	18.00 to 18.50
Blast Furnace Grades:	
Cast iron borings	10.25 to 10.50
Mixed borings and short turnings	10.25 to 10.50
No. 2 busheling	10.25 to 10.50
Cupola Grades:	
No. 1 cast	17.50 to 18.00
Railroad grate bars	11.00 to 12.00
Stove plate	12.00 to 12.50
Rails under 3 ft	18.50 to 19.00
Miscellaneous:	
Railroad malleable	18.00 to 18.50
Rails for rolling	16.25 to 16.50

Strip Steel.—The demand is rather light, particularly for cold-rolled strip, but probably was as good the past week as during several previous weeks. However, most mills have nearly wiped out their backlogs, and there has been considerable curtailment in operation of cold mills. The automotive industry is ordering strip only for early needs. Some pressure is being exerted against hot-rolled strip prices, but there is no evidence of a weakening. Little interest is being taken in fourth quarter contracts, and as yet there has been no real test of the attempt of mills to get 2.85c., Cleveland, for cold-rolled strip from large consumers.

Coke.—Demand for by-product coke for domestic use has fallen off since the recent 25c. a ton price advance, previous to which dealers had bought fairly heavily. Foundry coke is not active, but is firm at $4.85, ovens, for the better grades of Connellsville fuel. Ohio by-product coke is unchanged at $8.25, ovens.

Philadelphia

Mill Output Lower But Still Exceeds New Orders—Shipyard Buys 18,000 Tons of Steel

PHILADELPHIA, Sept. 17.—Steel mill operations show a further recession, output at present ranging from 75 to 90 per cent of capacity. Deliveries are less extended, and ordinary specifications for plates, shapes, bars or sheets are shipped in one to two weeks. Plate mills continue better occupied than other mills, but even plate producers are shipping slightly in excess of new business, although some improvement in buying in the past week is reported. Railroad demand is fair, and some large rail inquiries for next year are expected soon from the Pennsylvania and the New York Central. The Pennsylvania is inquiring for 8000 kegs of spikes. Plate and shape tonnage for new ships continues to be placed, the latest contract covering upward of 18,000 tons for two ships for the Export Steamship Co., being built by the New York Shipbuilding Co., Camden, N. J.

Pig Iron.—Competition of Southern pig iron has lessened, as most Birmingham sellers are endeavoring to maintain a minimum of $14 a ton, f.o.b. furnace. About 2000 tons of floor iron for the Baldwin Locomotive Works is expected to be placed with an Alabama producer or an eastern Pennsylvania steel company furnace. Eastern Pennsylvania sellers are maintaining $21 a ton, furnace, on most current business, but buyers claim that slight concessions are obtainable when Southern pig iron is a competitor. The American Engineering Co. has not yet closed on 1000 tons of foundry iron, but bought a carload of Bessemer last week. Basic iron is quiet and purchases by consumers in this district covering their requirements to the end of the year are not expected until early next month. Low phosphorus iron prices are firm, but business is small.

Prices per gross ton at Philadelphia:

East. Pa. No. 2, 1.75 to 2.25 sil.	$21.26 to $21.76
East. Pa. No. 2X, 2.25 to 2.75 sil.	21.76 to 22.26
East. Pa. No. 1X	22.26 to 22.76
Basic (del'd east. Pa.)	19.75 to 20.25
Gray forge	20.00 to 20.50
Malleable	21.25 to 21.75
Stand. low phos. (f.o.b. N. Y. State furnace)	22.00 to 23.00
Cop. br'g low phos. (f.o.b. furnace)	23.50 to 24.00
Va. No. 2 plain, 1.75 to 2.25 sil.	24.04
Va. No. 2X, 2.25 to 2.75 sil.	24.54

Prices, except as specified otherwise, are deliv'd Philadelphia. Freight rates: 76c. to $1.64 from eastern Pennsylvania furnaces; $4.54 from Virginia furnaces.

Bars.—Mill operations have been steadily curtailed in an effort to balance output with the volume of new business being booked, but, although production is now 75 to 80 per cent of capacity, it is still slightly in excess of new orders. The price is unchanged at 1.95c., Pittsburgh, or 2.27c., delivered Philadelphia.

Reinforcing Bars.—Competition between sellers of billet steel and rail steel bars is still a factor in maintaining prices at a low level, quotations ranging from 1.95c. to 2c., Pittsburgh, or 2.27c. to 2.32c., delivered Philadelphia, on billet steel bars, with the extra of $5 for cutting to length usually omitted. Rail steel bar sellers quote 1.95c., Franklin, Pa., or Tonawanda, N. Y., or 2.27c., Philadelphia, with no extra for cutting to length, but to obtain orders concessions are generally necessary to provide the buyer with a saving from the billet steel price. Recent awards of reinforcing bars have included 100 tons for a school at Chew and Upsal Streets, Philadelphia, to the Truscon Steel Co., and 280 tons for a laboratory for the Gulf Refining Co. to the Roslyn-Gilmore Steel Co.

Shapes.—Mills have a fair backlog of business on their books, but current buying is light. Fabricators are bidding on a substantial tonnage of new construction, however, and increased buying is expected. Prices are unchanged at 1.95c. to 2.05c., f.o.b. nearest mill to consumer, or 2.01c. to 2.11c. delivered Philadelphia.

Plates.—Fabricators of tanks and railroad cars have provided a substantial part of the tonnage on mill books at present, and shipbuilding promises to contribute some heavy contracts before the end of the year. In the past week the New York Ship Building Corporation, Camden, N. J., has placed about 15,000 tons of plates and 3000 tons of shapes for two ships. Operating rates of mills are slightly reduced, but still are from 80 to 90 per cent of capacity. The quotation is unchanged at 2.05c.,

Coatesville, Pa., or 2.15c., delivered Philadelphia.

Old Material.—With the exception of recent purchases totaling about 40,000 tons of No. 1 heavy melting steel by the leading eastern Pennsylvania consumer in the past two weeks, the market has been unusually quiet. No. 2 heavy melting steel is being shipped to Harrisburg, Phoenixville, Conshohocken and Bethlehem, Pa., but consumers of No. 1 steel at Coatesville, Pa., and Claymont, Del., have sizable stocks on their yards. Heavy breakable cast continues quiet, and consumers are not inclined to pay more than $14.50 a ton, delivered, although some brokers are paying up to $14.50 a ton to fill old orders.

Prices per gross ton delivered consumers' yards, Philadelphia district:

No. 1 heavy melting steel		$16.50
Scrap T rails		16.00
No. 2 heavy melting steel	12.50 to	14.50
No. 1 railroad wrought	16.00 to	16.50
Bundled sheets (for steel works)		11.50
Hydraulic compressed, new	14.50 to	15.00
Hydraulic compressed, old	12.00 to	12.50
Machine shop turnings (for steel works)		12.00
Heavy axle turnings (for equiv.)	14.00 to	14.50
Cast borings (for steel works and roll. mill)	11.00 to	11.75
Heavy breakable cast (for steel works)	14.50 to	15.00
Railroad grate bars	12.00 to	12.50
Stove plate (for steel works)	12.00 to	12.50
No. 1 low phos., hvy., 0.04% and under	22.00 to	23.00
Couplers and knuckles	19.50 to	20.50
Rolled steel wheels	19.50 to	20.50
No. 1 blast f'nace scrap	10.50 to	11.00
Wrot. iron and soft steel pipes and tubes (new specific.)		15.00
Shafting	19.00 to	20.00
Steel axles	23.00 to	23.50
No. 1 forge fire		14.00
Cast iron carwheels	16.50 to	17.00
No. 1 cast	16.50 to	17.00
Cast borings (for chem. plant)		14.50
Steel rails for rolling	16.50 to	17.00

Sheets.—Automobile body builders in this district are operating better than for some weeks, but not much change is apparent in radio production, which is off slightly with the exception of one plant. Blue annealed sheets, No. 13 gage, are quoted at 2.25c. to 2.35c., Pittsburgh, or 2.57c. to 2.67c., delivered Philadelphia, and light plates, blue annealed, are 2.10c. to 2.20c., Pittsburgh, or 2.42c. to 2.52c., delivered Philadelphia, the lower quotation usually applying when competition is encountered from continuous sheets. A recent purchase of upward of 800 tons of blue annealed sheets by a railroad was on a basis of 2.20c., f.o.b. mill for No. 10 gage. Black sheet prices are fairly stable at 2.85c., Pittsburgh, or 3.17c., delivered Philadelphia, but galvanized sheet prices range from 3.50c. to 3.60c., Pittsburgh, or 3.82c. to 3.92c., delivered Philadelphia.

Imports.—In the week ended Sept. 14, 1020 tons of pig iron arrived at this port, of which 600 tons was from the United Kingdom and 420 tons from Norway. Iron ore imports consisted of 5370 tons from Algeria and 492 tons from Spain. Steel arrivals were 138 tons of steel bars from Germany, 4 tons of structural shapes from the United Kingdom, 5 tons of iron bars from Sweden and 15 tons of steel scrap from the United Kingdom. A shipment of 25 tons of ferrochrome was received from Switzerland.

Warehouse Prices, f.o.b. Philadelphia

	Base per Lb.
Plates, ¼-in. and heavier	2.70c.
Plates, ⅜-in.	2.90c.
Structural shapes	2.70c.
Soft steel bars, small shapes, iron bars (except bands)	2.80c.
Round-edge iron	3.50c.
Round-edge steel, iron finished 1½ x 1½ in.	3.50c.
Round-edge steel planished	4.30c.
Reinforc. steel bars, sq. twisted and deform.	2.60c. to 2.80c.
Cold-fin. steel, rounds and hex	3.60c.
Cold-fin. steel, sq. and flats	4.10c.
Steel hoops	3.55c.
Steel bands, No. 12 to ⅜-in. inclus.	3.30c.
Spring steel	5.00c.
*Black sheets (No. 24)	4.10c.
†Galvanized sheets (No. 24)	4.85c.
Light plates, blue annealed (No. 10)	3.25c.
Blue ann'l'd sheets (No. 13)	3.40c.
Diam. pat. floor plates—	
¼-in.	5.30c.
⅜-in.	5.50c.
Rails	3.20c.
Swedish iron bars	6.60c.

*For 50 bundles or more: 10 to 49 bun., 4.10c. base; 1 to 9 bun., 4.35c. base.
†For 50 bundles or more: 10 to 49 bun., 4.95c. base; 1 to 9 bun., 5.30c. base.

Labor Turnover Now On a Monthly Basis

About a month ago the United States Bureau of Labor Statistics took over from the Metropolitan Life Insurance Co., New York, the task of collecting and publishing each month rates of labor turnover. The figures are being put out now on the monthly basis, in addition to the equivalent annual basis which heretofore has prevailed.

Expressed as a percentage of the number of employees on the payroll, the net turnover rate in July is given as 3.8, which is the lowest since last February. It compares with 4.2 in June and with a maximum in the past 20 months of 4.6 in April. The latest figure, however, is higher than any of 1928 with the exception of September, comparing with 3.2 in July and with an average of 3.1 through the whole year.

The accession rate is given as 5.2 in July, the highest since April and comparing with 5.0 in June and with 4.0 in July, 1928. Except for April no month of the last 20 shows a higher accession rate than that for July.

Turnover rate is defined by the bureau as the rate necessary to keep the plant going, on the volume of business it has at any moment. A growing plant, or one in which the business is growing at any moment, has an accession rate higher than the separation rate. A plant in which business is declining has a separation rate greater than the accession rate. Consequently, the net turnover rate with the force increasing is the same as the separation rate; with a declining force it is the same as the accession rate.

For the past 20 months, over which the current figures are shown, the accession rates have been consistently month by month higher than the separation rates, indicating that there has been a steady increment in employment. These figures are from more than 300 factories with more than 600,000 employees.

High Record in Fabricated Steel Orders

WASHINGTON, Sept. 17.—Fabricated structural steel orders in August totaled 289,326 net tons, according to reports received by the Department of Commerce from 195 firms with a capacity of 306,005 tons, bookings representing 90 per cent of their capacity. Computed bookings were 365,750 tons, while computed shipments were 338,800 tons, or 88 per cent of capacity.

August orders reported were the highest since March of the present year, when producers reported bookings of 296,343 tons. Computed tonnages booked and shipped in August were both the highest on record, but the fact that only 195 concerns reported left a large capacity for computing bookings and shipments of firms from which no reports were received.

July bookings of 288,801 tons were reported by 223 firms and represented 91 per cent of their capacity of 316,095 tons. Computed bookings for July were 350,350 tons and computed shipments were 304,150 tons, or 79 per cent of capacity. The greatest number of reporting firms for the current year was in February, with a total of 236, or 41 more than the number reporting for August.

Next to August the highest computed bookings total was 358,050 tons for March, while the next highest computed shipments were in May, with a total of 311,850 tons.

Computed bookings for the first eight months of the current year totaled 2,637,258 tons, against 2,221,450 tons for the corresponding period of last year, while computed shipments were 2,344,658 tons, compared with 1,978,900 tons.

Automobile stocks continue to be a major problem with manufacturers, says *Automotive Industries*. Dealer passenger stocks showed a sharp increase from August, 1928, to August, 1929. In the face of this and considering the fact that low-priced automobile manufacturers, notably Ford and Chevrolet, have indicated continued heavy production, sharp curtailment can be expected in the industry, unless the estimate of 5,500,000 units for the year is exceeded. Thus far September production has held up, according to factory executives. The totals are slightly higher than those for the first two weeks of last month, it is reported from Detroit. Therefore, any recession of production would become effective soon unless it were to take the form of a complete shut-down in several factories.

Pacific Coast

Heavy Plate Bookings Include 10,000 Tons for Everett, Wash., Pipe Line—Price Situation Steady

SAN FRANCISCO, Sept. 14.—(*By Air Mail.*)—Some improvement was noticeable in the demand for iron and steel products on the Pacific Coast during the past week, the plate and structural shape markets having been the most active. Plate bookings, at more than 12,000 tons, were the heaviest of any week so far this year and included 10,000 tons which the Steel Tank & Pipe Co. of Oregon will furnish for a pipe line at Everett, Wash. Movement of cast iron pipe and reinforcing steel bar tonnages was confined to lots under 100 tons. Prices continue on a fairly even basis, with little or no shading.

Considerable interest was shown in the opening of the new bolt, nut and rivet plant of the Pacific Coast Steel Co. at South San Francisco on Sept. 12. More than 1000 steel mill representatives, manufacturers and buyers attended the opening ceremonies and luncheon served in one of the bays of the new building. The plant has a capacity of 1200 tons a month.

Pig Iron.—Demand for foundry pig iron has shown little signs of improvement during the past few weeks, sales and inquiries continuing to involve unimportant tonnages. Prices are unchanged.

Prices per gross ton at San Francisco:

*Utah basic	$25.00 to $26.00
*Utah fdy., sil. 2.75 to 3.25	25.00 to 26.00
**Indian fdy., sil. 2.75 to 3.25	25.00 to 26.00

*Delivered San Francisco.
**Duty paid, f.o.b. cars San Francisco.

Bars.—Reinforcing steel bar awards were confined to lots of less than 100 tons. Out-of-stock distributers in the San Francisco district report few important projects pending and say that the week's business was the poorest for any week so far this year. Bids were opened on 127 tons for the west approach of the St. John's River bridge at Portland and on 285 tons for highway work in Sonoma County, Cal. Prices appear to be firm at 2.30c., base, on carload lots and 2.60c. on smaller tonnages in the San Francisco district, with $2 a ton higher prevailing in the Los Angeles section. Merchant bar steel is quoted at 2.35c., c.i.f., and demand continues to call for small lots composed of numerous sizes.

Warehouse Prices, f.o.b. San Francisco

	Base per Lb.
Plates and struc. shapes	3.15c.
Soft steel bars	3.15c.
Small angles, ⅞-in. and over	3.15c.
Small angles, under ⅞-in.	3.55c.
Small channels and tees, ¾-in. to 2¾-in.	3.75c.
Spring steel, ¼-in. and thicker	5.00c.
Black sheets (No. 24)	4.90c.
Blue ann'l'd sheets (No. 10)	3.80c.
Galv. sheets (No. 24)	5.30c.
Struct. rivets, ½-in. and larger	5.65c.
Com. wire nails, base per keg	$3.40
Cement c'td' nails, 100 lb. keg	3.40

Plates.—Several important pipe line tonnages were placed during the week. The Steel Tank & Pipe Co. took 10,000 tons of plates for the Everett, Wash., pipe line, 2200 tons of 36 and 48-in. pipe for Spokane, Wash., and 330 tons for two 30-in. siphons at Manson, Wash. The Willamette Iron & Steel Works secured 200 tons for gates for the Mount Diablo dam, Seattle. Pending business includes 360 tons of 18-in. welded steel pipe for Montecito, Cal., bids on which have been opened. Prices are firm at 2.35c., c.i.f.

Shapes.—More than 2000 tons of structural shapes were let this week. The largest award called for 400 tons for the West Garfield Street bridge, Seattle, and went to the Pacific Car & Foundry Co. The Consolidated Steel Corporation took 350 tons for a grandstand at Agua Caliente, the United States Steel Products Co. booked 120 tons for a bridge over the San Lucas River, Salinas, Cal., and the Judson-Pacific Co. took 325 tons for a warehouse for the American Can Co. and 150 tons for an apartment house on Sacramento Street, both in San Francisco. Bids have been opened on 335 tons for the west approach of the St. John's River bridge, Portland, and on 136 tons for a grandstand at Riverside, Cal. Bids were also opened on 738 tons for a bridge over the Shasta River near Yreka, Cal. Plain shapes remain firm at 2.35c., c.i.f.

Cast Iron Pipe.—Demand for cast iron pipe is unusually quiet, and tonnages placed this week were confined to lots of less than 100 tons. Only a few small awards were reported. Pending business involves less than 1500 tons. Anaheim, Cal., will place 377 tons of 6 to 10-in. Class B pipe next week. No new inquiries of importance came up for figures this week.

Track Material.—The United States Steel Products Co. took 550 tons of girder rails, 450 tons involving 105-lb. rail, 21,000 tie plates, 13,000 brace tie plates, 30 kegs of track bolts, 130 kegs of track spikes and 82 special layouts for the municipal railroad, San Francisco. It was also low bidder on 40 tons of 128-lb. girder rails and other specialties for the Port Commission, Oakland.

Birmingham

Southern Pig Iron Buying Gains—Another Blast Furnace Goes Out—Steel Backlogs Still Large

BIRMINGHAM, Sept. 17.—Sales of pig iron to district consumers are at an undiminished rate. Apparently confident that the volume of business will hold up for the remainder of the year, some of the larger consumers are covering their entire fourth quarter requirements. A feature of the market last week was a notable increase in requisitions followed closely by urgent tracers. With increased foundry melt in prospect and with the blowing out of another furnace, the market is in a stronger position as regards prices, though there has been no intimation of price advances. Sales to outside points have slumped considerably in the past few days, possibly because of higher prices quoted. The district price for No. 2 foundry remains at $14.50. Concessions from this price on Eastern and Middle West sales are less than they were 10 days ago. Shipments are at the highest point of the year. The No. 4 North Birmingham furnace of the Sloss-Sheffield Steel & Iron Co. has been blown out, leaving a total of 13 active furnaces. Of this number, eight are on foundry and five on basic iron.

Prices per gross ton, f.o.b. Birmingham dist. furnaces:

No. 2 fdy., 1.75 to 2.25 sil.	$14.50
No. 1 fdy., 2.25 to 2.75 sil.	15.00
Basic	14.50

Finished Steel.—Indications are that there will be no material decrease in new business in plates, bars, structural shapes and sheets before the arrival of the fall buying period. Backlogs in these lines have been well maintained during the past few weeks. There has been no further reduction in operations since the rail mill at Ensley was shut down about the middle of August. Orders on books are sufficient for three to four weeks' operations. Wire product demand is improving. Structural steel fabricating shops are working off backlogs. The majority of the plants report both demand and new business at the low point of the year so far. The Virginia Bridge & Iron Co. has booked 400 tons for airplane hangars in Brazil and 200 tons for a hangar at Atlanta, Ga. Reinforcing bar demand has declined since August and can hardly be considered up to normal. All finished steel prices are the same. Seventeen open-hearths are active, the same as last week.

Cast Iron Pipe.—Pressure pipe plants continue to work off backlogs as new business falls short of output. Operations at individual plants vary from 65 to 80 per cent of capacity. The bulk of new business in the past week was in small lots, occasionally supplemented by fair-sized tonnages from the West and Middle West. Several municipalities in the Southern territory that have construction programs prepared are still holding off because of an unsatisfactory market for their bonds. Nashville, Tenn., is taking bids this week for 3400 ft. of 6-in. pipe. About the same amount is to be bought a little later. Other

projects to be awarded this week include 11,600 ft. of 4-in. and 3700 ft. of 6-in. pipe for St. Joseph, La., and 3700 ft. of 6 and 8-in. pipe for Brooklet, Ga. Prices remain steady at $37 to $38 a net ton, base Birmingham.

Coke.—The movement of foundry coke is better than the August average. Prospects are reported brighter for further increase in demand. Prices remain at $5 a net ton, Birmingham.

Old Material.—One of the larger users of steel scrap has withdrawn from the market on account of reduced open-hearth operations. Purchases by other users of steel grades are in undiminished volume. Cast iron grades improved slightly during the past week. Prices are unchanged.

Prices per gross ton, deliv'd Birmingham dist. consumers' yards:

Heavy melting steel	$13.00 to $13.50
Scrap steel rails	14.00
Short shoveling turnings	9.00
Cast iron borings	9.00
Stove plate	11.50 to 12.00
Steel axles	21.00
Iron axles	23.00
No. 1 railroad wrought	10.00 to 10.50
Rails for rolling	15.50
No. 1 cast	13.50
Tramcar wheels	13.50
Cast iron carwheels	13.00 to 13.50
Cast iron borings, chem	13.50 to 14.00

Cincinnati

Southern Pig Iron Firmer But Sales Decline—Sheet Steel Sales Gain—Scrap Weaker

CINCINNATI, Sept. 17.—With district consumers of pig iron well covered for the remainder of this quarter and reluctant to close for the fourth quarter, sales of pig iron declined last week. The total amount placed was about 8800 tons, of which 1800 tons was Southern iron in 100 and 200-ton lots. Increased firmness in Southern iron is reflected in reports that all Southern furnaces except one are now quoting $14.50, base Birmingham, in this district and the lowest price at which this iron is obtainable here is $13.50. Although part of the business last week went at $13.50 and $14, selling agents are without authority to quote less than formal schedules, but concessions of about 50c. on tonnage orders are likely. The largest order during the week was from a central Ohio consumer, which took 2500 tons of Northern foundry iron for fourth quarter at a price which figures back to $18.50, base Lake furnace. A Cincinnati buyer bought 750 tons of Northern foundry iron and two Southern Indiana consumers each took 600 tons of the same grade. A Dayton, Ohio, consumer is inquiring for 350 tons of Northern foundry iron, and the Louisville & Nashville Railroad is in the market for 351 tons, of which 25 tons is charcoal iron.

Prices per gross ton, deliv'd Cincinnati:

So. Ohio fdy., sil. 1.75 to 2.25	$19.89 to $20.39
Ala. fdy., sil. 1.75 to 2.25	17.19 to 18.19
Ala. fdy., sil. 2.25 to 2.75	17.69 to 18.69
Tenn. fdy., sil. 1.75 to 2.25	17.19 to 18.19
S'th'n Ohio silvery, 8 per cent	26.89

Freight rates, $1.89 from Ironton and Jackson, Ohio; $3.69 from Birmingham.

Finished Material. — Continued liberal specifications from users of sheets brought new tonnage of district sheet mills well ahead of output during the last week, adding to backlogs. This demand, however, is due in a large degree to the desire of consumers to assure a steady supply of material, and, accordingly, they are specifying in larger quantities in anticipation of their needs for 40 to 90 days. The situation on galvanized sheets in the Southern market is reported to have become somewhat steadier and more in line with the continued adherence to price schedules in other lines. Wire products and wire nails, however, are still weak and sluggish, because of uncertainty of prices. Nails are reported to be obtainable at substantial price concessions.

Coke. — Shipments of by-product foundry coke are going forward at fair rate, although specifications are slightly under the August level. Beehive coke also is showing some activity, one oven representative reporting that 32 spot carloads were shipped last week. The Louisville & Nashville Railroad is in the market for 470 tons of foundry coke for fourth quarter.

Old Material.—Continued reluctance of the mills to take scrap at increased prices has forced dealers' schedules down for the first time in three months. Dealers, however, are still bidding strongly for heavy melting steel, cast iron borings, machine shop turnings and No. 2 wrought, but are offering 25c. a ton less than a week ago. It is reported that recent railroad lists brought prices equal to those paid a month ago, and in a few instances dealers are said to have paid higher prices. Accordingly, with good scrap none too plentiful, it is the opinion in the trade that the present softness of the market is only temporary.

Dealers' buying prices per gross ton, f.o.b. cars, Cincinnati:

Heavy melting steel	$14.00 to $14.50
Scrap rails for melting	14.25 to 14.75
Loose sheet clippings	9.00 to 9.50
Bundled sheets	11.00 to 11.50
Cast iron borings	9.00 to 9.50
Machine shop turnings	8.25 to 8.50
No. 1 busheling	10.50 to 11.00
No. 2 busheling	7.00 to 7.50
Rails for rolling	14.50 to 15.00
No. 1 locomotive tires	14.25 to 14.75
No. 2 railroad wrought	14.00 to 14.50
Short rails	18.50 to 19.00
Cast iron carwheels	12.75 to 13.25
No. 1 machinery cast	19.00 to 19.50
No. 1 railroad cast	15.25 to 15.75
Burnt cast	10.25 to 10.75
Stove plate	10.25 to 10.75
Brake shoes	10.25 to 10.75
Agricultural malleable	14.25 to 14.75
Railroad malleable	15.25 to 15.75

Warehouse Prices, f.o.b. Cincinnati

	Base per Lb.
Plates and struc. shapes	3.40c.
Bars, soft steel or iron	3.30c.
New billet reinforc. bars	3.15c.
Rail steel reinforc. bars	3.00c.
Hoops	4.05c.
Bands	3.50c.
Cold-fin. rounds and hex	3.85c.
Squares	4.35c.
Black sheets (No. 24)	4.05c.
Galvanized sheets (No. 24)	4.90c.
Blue ann'l'd sheets (No. 10)	3.45c.
Structural rivets	3.85c.
Small rivets	65 per cent off list
No. 9 ann'l'd wire, per 100 lb	$3.00
Com. wire nails, base per keg	2.85
Cement c't'd nails, base 100 lb. keg	2.85
Chain, per 100 lb	8.75
	Net per 100 Ft.
Lap-weld steel boiler tubes, 2-in.	$16.00
4-in.	33.00
Seamless steel boiler tubes, 2-in.	17.00
4-in.	34.00

Canada

Pig Iron Buying for Last Quarter Begins

TORONTO, ONT., Sept. 17.—Canadian blast furnace representatives have opened books for pig iron for last quarter delivery. Forward buying has become fairly active and a number of contracts have been closed. About 5000 tons is pending for early closing. Sales in the past week for spot delivery were upward of 2000 tons. Prices are unchanged.

Prices per gross ton:

Delivered Toronto	
No. 1 fdy., sil. 2.25 to 2.75	$24.60
No. 2 fdy., sil. 1.75 to 2.25	24.10
Malleable	24.60
Delivered Montreal	
No. 1 fdy., sil. 2.25 to 2.75	$26.00
No. 2 fdy., sil. 1.75 to 2.25	25.50
Malleable	26.00
Basic	24.50
Imported Iron, Montreal Warehouse	
Summerlee	$33.50
Carron	33.00

Structural Steel.—A stronger demand has developed for building steel. Contracts placed during the week exceeded 10,000 tons, most of which was in orders for lots under 500 tons. Upward of 20,000 tons is pending for early closing and other large tonnages are in prospect.

Old Material.—Business in this market is developing on a larger scale. Orders run strongly to the iron grades, In steel scrap, the demand is most active in the Montreal market, where buying is reported for domestic consumption as well as for export. Prices are firm but unchanged.

Dealers' buying prices:

	Per Gross Ton Toronto	Montreal
Heavy melting steel	$10.00	$8.50
Rails, scrap	11.00	9.00
No. 1 wrought	10.00	12.00
Machine shop turnings	7.50	5.00
Boiler plate	7.50	6.00
Heavy axle turnings	8.00	7.50
Cast borings	7.50	5.00
Steel borings	7.50	6.50
Wrought pipe	6.00	6.00
Steel axles	15.00	20.00
Axles, wrought iron	17.00	22.00
No. 1 machinery cast	....	17.00
Stove plate	....	13.00
Standard carwheels	....	16.00
Malleable	....	13.00
	Per Net Ton	
No. 1 mach'ry cast	$16.00	....
Stove plate	12.00	....
Standard carwheels	15.00	....
Malleable scrap	14.00	....

St. Louis

Southern Pig Iron Sales in District Totalled 125,000 Tons —Scrap Prices Decline

ST. LOUIS, Sept. 17.—The heavy buying movement in Southern pig iron, which began about 30 days ago and which resulted in the sale of more than 125,000 tons to melters in this district, according to trade estimates, is said to have subsided. Because of the placing of this large tonnage, it is not expected that there will be much buying during the remainder of the year. The three leading pig iron producers in the South are now regarded as being well booked, and the market is firmer. The drive of Southern makers was to find an outlet for their surplus iron, and prices naturally have varied, ranging from $12.50 to $13.50. Included in the Southern sales was a good tonnage of basic, some new users being developed as a result of the campaign. One of the Southern makers, Republic Iron & Steel Co., is now out of the market. Sales of the St. Louis Gas & Coke Corporation in the past week totaled about 1800 tons, of which 400 tons was malleable. A St. Louis jobbing foundry took 500 tons, a Diesel engine builder took 270 tons, a jobbing foundry in Kansas and an Alabama pipe foundry bought 100 tons each, all foundry. All sales, excepting a few spot carloads, were for shipment over the remainder of the year.

Prices per gross ton at St. Louis:

No. 2 fdy., sil. 1.75 to 2.25, f.o.b. Granite City, Ill.	$19.50 to $20.00
Malleable, f.o.b. Granite City	20.00
N'th'n No. 2 fdy., deliv'd St. Louis	22.16
Southern No. 2 fdy., deliv'd	16.92 to 18.92
Northern malleable, deliv'd	22.16
Northern basic, deliv'd	22.16

Freight rates: 75c. (average) Granite City to St. Louis; $2.16 from Chicago; $1.42 from Birmingham.

Finished Iron and Steel.—Railroads centering in St. Louis have issued requests for prices on fourth quarter requirements of plates, shapes, bars and sheets, with no quantities specified. Both new business and specifications in the items named are light. Structural business is light.

Old Material.—The market for steel works scrap is weaker because of large purchases of basic iron to replace scrap, heavier movement of material to this market from the railroads and country dealers and smaller buying by mills. An improvement is expected within the next 30 days. No. 1 heavy melting is down 25c. a ton and No. 2 grade is off 50c. Railroad lists include: Chesapeake & Ohio, 7481 tons; Louisville & Nashville, 3075 tons; Missouri-Kansas-Texas, 1500 tons; Chicago, Indianapolis & Louisville, 1125 tons; Chicago & Alton, 1200 tons; Chicago, Rock Island & Pacific, 100 tons; Great Northern, 65 carloads; Nickel Plate, 54 carloads.

Dealers' buying prices per gross ton, f.o.b. St. Louis district:

No. 1 heavy melting or shoveling steel	$14.25 to $14.75
No. 2 heavy melting or shoveling steel	13.50 to 14.00
No. 1 locomotive tires	15.50 to 16.00
Miscel. stand-sec. rails including frogs, switches and guards, cut apart	16.75 to 17.25
Railroad springs	19.00 to 19.50
Bundled sheets	10.50 to 11.00
No. 2 railroad wrought	14.25 to 14.75
No. 1 busheling	10.00 to 10.50
Cast iron borings and shoveling turnings	9.50 to 10.00
Iron rails	13.00 to 13.50
Rails for rolling	17.00 to 17.50
Machine shop turnings	7.50 to 8.00
Heavy turnings	10.00 to 10.50
Steel car axles	19.50 to 20.00
Iron car axles	26.50 to 27.00
Wrot. iron bars and trans.	21.50 to 22.00
No. 1 railroad wrought	13.75 to 14.25
Steel rails, less than 3 ft.	18.00 to 18.50
Steel angle bars	15.25 to 15.75
Cast iron carwheels	15.00 to 15.50
No. 1 machinery cast	15.25 to 15.75
Railroad malleable	16.00 to 16.50
No. 1 railroad cast	14.75 to 15.25
Stove plate	13.00 to 13.50
Agricult. malleable	15.25 to 15.75
Relay. rails, 60 lb. and under	20.50 to 23.50
Relay. rails, 70 lb. and over	26.50 to 29.00

Warehouse Prices, f.o.b. St. Louis

	Base per Lb.
Plates and struc. shapes	3.25c.
Bars, soft steel or iron	3.15c.
Cold-fin. rounds, shaftings, screw stock	3.75c.
Black sheets (No. 24)	4.25c.
Galv. sheets (No. 24)	5.10c.
Blue ann'l'd sheets (No. 10)	3.45c.
Black corrug. sheets (No. 24)	4.30c.
Galv. corrug. sheets	5.15c.
Structural rivets	3.95c.
Boiler rivets	3.95c.
	Per Cent Off List
Tank rivets, ⅞-in. and smaller, 100 lb. or more	65
Less than 100 lb.	60
Machine bolts	60
Carriage bolts	60
Lag screws	60
Hot-pressed nuts, sq., blank or tapped, 200 lb. or more	60
Less than 200 lb.	50
Hot-pressed nuts, hex., blank or tapped, 200 lb. or more	60
Less than 200 lb.	50

Youngstown

Demand for Sheets and Pipe Sustains Operations in Valley District at 85 to 90 Per Cent

YOUNGSTOWN, Sept. 17.—Definite indications of the trend of steel demand in this district during the last quarter are still lacking, but Valley steel makers are firm in the opinion that improvement in both new orders and specifications may be expected in the next 30 days. With fourth quarter contract buying imminent, considerable expansion of order books is practically certain, but it is not yet known whether this expansion will be as large as usual, or whether large steel consumers will immediately issue rolling authorizations in greater volume than they have in the last month.

No price changes are being made for the next quarter, so steel users have no price incentive for specifying beyond their immediate needs. They may even go so far as to defer the placing of fourth quarter contracts, as considerable steel is still owed them on present contracts in some cases.

Operations in the Valley district average from 85 to 90 per cent and are being sustained principally by the large demands upon the sheet and pipe mills. Sheet mills are still operating at above 90 per cent, and backlogs of some large makers insure the continuance of this rate for another month. Others will have to curtail sharply by Oct. 1, unless specifications increase. Pipe units are at the best rate of the year and makers are optimistic for the remainder of the period. Tin plate production has dropped to 75 per cent and will go lower before fall buying develops. Bar mills have also curtailed sharply, the operations of the Steel Corporation units alone keeping up the general average for the district.

The Youngstown area can expect little benefit from developing rail and rail equipment purchases, and, aside from large local consumers of its principal products, must look to the automobile industry as the principal outlet for its surplus steel.

In placing its October requirements, this industry has given Valley mills little encouragement. The Ford Motor Co. will require less steel than it took in September on account of its decline from a six-day to a five-day week operation, and other large users of Youngstown steel in the Michigan district are releasing specifications slowly. At no time in the recent past has the automobile industry conformed its steel buying so closely to the probable market for cars. This year, however, the heavy automobile production during the first eight months has focused attention sharply on the possible limits of car purchasing.

Prices of both finished and semi-finished steel seem to be holding in this district. In fact, large producers direct attention to the price structure as the most favorable factor in a rather uncertain market. At least three large makers say that they will take no fourth quarter business on galvanized sheets at less than 3.60c., Pittsburgh, and intend to limit the number of jobbers to whom they will give the usual $2 preferential. Third quarter prices on black, blue annealed and automobile body sheets will be continued, and considerable fourth quarter tonnage has been placed at those figures. However, the bulk of such business is yet to come to mill order books. Strip prices apparently are holding at 2.75c. to 2.85c., Pittsburgh, for cold-rolled and 1.90c. and 2c. on hot-rolled. Production has been sharply cut down, however, and this is

pointed out as an evidence of price strength. Some makers presumably would rather close down a mill for a week or even longer rather than take business at concessions. In the case of hot-rolled strip such a policy is declared to be justified on account of the narrow margin of profit possible.

On billets, slabs and sheet bars, makers are quoting $35, Youngstown, on fourth quarter business. The price has not been adequately tested except in the case of sheet bars. Fourth quarter pig iron buying is not yet in evidence, although a few fair-sized inquiries have appeared. Prices will be unchanged at $18.50, Valley, for foundry and basic, and $19 for malleable and Bessemer. Furnaces in this district have been too well supplied with orders this summer to feel the competition of the Pittsburgh merchant furnace, but have recently had to shade their prices 50c. or more a ton to take business in the Pittsburgh district. Such shading has not affected the price on iron going to points where Pittsburgh furnace competition is not met.

The scrap market has softened in the last week, but not as decidedly as has been the case in Pittsburgh, where the competition between dealers has had an unusually depressing effect.

Boston

Pig Iron Prices Firmer—Scrap Market Unsettled as Demands From Steel Mills Fall Off

BOSTON, Sept. 17.—Buffalo iron at $17 a ton, base furnace, has disappeared from this market. Attractive tonnages of No. 2X Buffalo iron can be purchased at $18 a ton, and No. 1X at $18.50, but on the general run of current bookings $18.50 and $19 respectively are being obtained. The firmer Buffalo prices are the result of smaller offerings of Buffalo and New York iron, and lessened competition from Southern iron due to an advance in prices for the latter. The Mystic Iron Works also is securing slightly higher prices for its product. The firmer prices, however, come at a time when little actual business is in view. The Sullivan Machinery Co., Claremont, N. H., is in the market for 400 tons of prompt shipment iron, the only open inquiry. Sales the past week did not run much above 3000 tons, mostly Mystic and Buffalo. The largest individual sale was 500 tons to a Connecticut foundry.

Foundry iron prices per gross ton deliv'd to most New England points:

†Buffalo, sil. 1.75 to 2.25	$21.78 to $22.28
‡Buffalo, sil. 2.25 to 2.75	22.28 to 22.78
*Buffalo, sil. 1.75 to 2.25	21.91 to 22.91
*Buffalo, sil. 2.25 to 2.75	22.41 to 23.41
East. Penn., sil. 1.75 to 2.25	22.65 to 23.15
East. Penn., sil. 2.25 to 2.75	23.15 to 23.65
Va., sil. 1.75 to 2.25	25.21
Va., sil. 2.25 to 2.75	25.71
*Ala., sil. 1.75 to 2.25	24.11
*Ala., sil. 2.25 to 2.75	24.61
†Ala., sil. 1.75 to 2.25	20.25
†Ala., sil. 2.25 to 2.75	20.75

Freight rates: $4.91 all rail from Buffalo, and $4.28 rail and water; $3.65 all rail from eastern Pennsylvania; $5.21 all rail from Virginia; $9.61 all rail from Alabama and $5.75 rail and water from Alabama to New England seaboard.

*All rail rate.

†Rail and water rate.

Coke.—It is now safe to predict that consumption of foundry coke in New England in 1929 will run ahead of that of 1928, possibly by 15 per cent. Current shipments are in good volume. The price of by-product fuel remains at $11 a ton, delivered within a $3.10 freight rate zone. Production and shipments of domestic coke by New England manufacturers continues on an increasing scale.

Fabricated Steel.—The market is more active than appears on the surface. Most fabricators report prospects more encouraging than a week ago, with competition keener than ever. To illustrate this point a Providence, R. I., fabricator, rarely taking business in Massachusetts, will fabricate 30 tons for a Cambridge, Mass., job. Some fabricators are figuring on a large tonnage of steel on a pound cost basis, present negotiations involving more than 5000 tons, with prospects of large additional tonnages by early October. Boston is endeavoring to secure lower prices on its Congress Street bridge, but fabricators are holding to bids submitted.

Reinforcing Steel.—Business in billet steel bars is slow in closing, sales the past week totaling 300 tons in dribbling lots, at 2.66½c., a lb., base, from stock. Several attractive tonnages are pending. Not much life is shown in the rail steel bar market, but there has been less shading of the open price, 2.26½c. a lb., base, delivered common Boston freight rate points.

Warehouse Prices, f.o.b. Boston

	Base per Lb.
Plates	3.365c.
Structural shapes—	
Angles and beams	3.365c.
Tees	3.365c.
Zees	3.465c.
Soft steel bars, small shapes	3.265c.
Flats, hot-rolled	4.15c.
Reinforcing bars	3.265c. to 3.54c.
Iron bars—	
Refined	3.265c.
Best refined	4.65c.
Norway rounds	6.60c.
Norway squares and flats	7.10c.
Spring steel—	
Open-hearth	5.00c. to 10.00c.
Crucible	12.00c.
Tie steel	4.50c. to 4.75c.
Bands	4.615c. to 5.00c.
Hoop steel	5.50c. to 6.00c.
Cold-rolled steel—	
Rounds and hex	*3.55c. to 5.55c.
Squares and flats	*4.05c. to 7.05c.
Toe calk steel	6.00c.
Rivets, structural or boiler	4.50c.
	Per Cent Off List
Machine bolts	50 and 5
Carriage bolts	50 and 5
Lag screws	50 and 5
Hot-pressed nuts	50 and 5
Cold-punched nuts	50 and 5
Stove bolts	70 and 10

*Including quantity differentials.

Old Material.—The scrap market is decidedly unsettled owing to weakness of prices in the Pittsburgh district and to the holding up of shipments by steel mills. Demand for No. 1 heavy melting steel is practically flat, a condition not existing in months. A few lots of steel turnings were bought on old contracts the past week at $7.50 a ton, on cars shipping point, but on new business $6.60 is the best price obtainable. There is some demand for pipe, but a limited supply, and prices are relatively firmer than for most other kinds of scrap. The Boston & Maine Railroad on Sept. 13 closed bids on approximately 80 cars of miscellaneous material. Prices obtained were lower than realized at the company's August sale. New England consumption of machinery cast holds up well and prices are steady. The German steamer Cronshagen has been chartered to load 4500 tons of scrap here for Danzig delivery, the rate being $6 a ton.

Buying prices per gross ton, f.o.b. Boston rate shipping points:

No. 1 heavy melting steel	$11.75 to $12.25
Scrap T rails	11.00 to 11.25
Scrap girder rails	10.00 to 11.00
No. 1 railroad wrought	11.00 to 11.50
No. 1 yard wrought	9.00 to 9.50
Machine shop turnings	6.60 to 7.50
Cast iron borings (steel works and rolling mill)	6.50 to 6.75
Bundled skeleton, long	10.00 to 10.25
Forge flashings	10.00 to 10.50
Blast furnace borings and turnings	6.00 to 6.25
Forge scrap	9.00 to 9.50
Shafting	14.00 to 14.50
Steel car axles	17.50 to 18.00
Wrought pipe 1 in. in diameter (over 2 ft. long)	9.75 to 10.00
Rails for rolling	12.00 to 12.50
Cast iron borings, chemical	9.75 to 10.00

Prices per gross ton deliv'd consumers' yards:

Textile cast	$14.00 to $14.50
No. 1 machinery cast	15.00 to 15.50
No. 2 machinery cast	13.00 to 13.25
Stove plate	11.00 to 11.50
Railroad malleable	18.00 to 18.50

Heavy Melting Steel Scrap Off 25c. at Detroit

DETROIT, Sept. 17.—Heavy melting and shoveling steel have declined 25c. a ton. There have been very few sales involving tonnage. Prices generally are on the low side of the quoted range.

Dealers' buying prices per gross ton, f.o.b. cars, Detroit:

Hvy. melting and shov. steel	$14.00 to $14.50
Borings and short turnings	9.00 to 9.50
Long turnings	8.50 to 9.00
No. 1 machinery cast	12.50 to 13.00
Automobile cast	13.00 to 13.50
Hydraul. comp. sheets	14.00 to 14.50
Stove plate	9.00 to 9.50
New No. 1 busheling	12.50 to 13.00
Old No. 1 busheling	11.00 to 11.50
Sheet clippings	8.75 to 9.25
Flashings	13.00 to 13.50

Big Rivet Job

It was estimated that the Merchandise Mart now under construction at Chicago, would require some 50,000 tons of structural steel. The latest information is that it will reach 58,000 tons, not including reinforcing steel and the ornamental iron part of the contract. There are on an average 12 rivets to a ton for this particular type of building, or 700,000 rivets all told.

Buffalo

Pig Iron Sales Upward of 12,000 Tons—8000 Tons of Structural Steel Awarded for City Hall

BUFFALO, Sept. 17.—Between 12,000 and 15,000 tons of pig iron was sold by Buffalo furnaces during the past week. It is now believed that most of the large buyers are covered for the remainder of the year except for emergency requirements. Included in the aggregate tonnage sold were several lots of 200 tons of foundry and malleable, several of 500 tons, one of 1200 tons and one of 1800 tons. An eastern purchaser bought 2500 tons of foundry and malleable, about half of each. The Ingersoll-Rand Co. is understood to have bought 700 tons of malleable. The Baldwin Locomotive Co. has an inquiry pending for 1500 tons of malleable. Most of the past week's business was taken on an $18 Buffalo, base, all-rail delivery. In some cases differentials were waived. Nothing under $19.50, Buffalo, has been taken for district delivery, it is stated, and the Buffalo price in the East has now strengthened to the point where $18.50 is being more freely quoted than $18.

Prices per gross ton, f.o.b. furnace:

No. 2 fdy., sil. 1.75 to 2.25	$19.50
No. 2X fdy., sil. 2.25 to 2.75	20.00
No. 1 fdy., sil. 2.75 to 3.25	21.00
Malleable, sil. up to 2.25	20.00
Basic	18.50
Lake Superior charcoal	27.28

Finished Iron and Steel.—The most important development in the fabricated structural field in the last week was the awarding of 8000 tons for the New City Hall of Buffalo to the McClintic-Marshall Co. Several other smaller fabricated structural lots were closed, all less than 100 tons. The reinforcing bar market has been brisk, with one lot of 500 to 600 tons for the Buffalo General Electric Co. and some smaller lots placed. Operations of local mills continue at the same rate as recently, about 90 per cent average or better. Sheet business in particular is good.

Old Material.—A sale of a comparatively small tonnage of No. 1 heavy melting steel was made during the past week at a price reported to be $17.50 to $17.75, indicating a slight weakening in this commodity. Some sales of short rails were reported at $19.50, but there appears to have been very little other buying. Business from foundries has dropped off considerably. Three of the local blast furnace interests continue to take in blast furnace scrap on old orders, but there has been no new buying. There has been quite a reduction in the production of scrap, several of the automobile plants being on lower schedules than heretofore.

Prices per gross ton, f.o.b. Buffalo consumers' plants:

Basic Open-Hearth Grades:	
No. 1 heavy melting steel	$17.50 to $17.75
No. 2 heavy melting steel	14.75 to 15.00
Scrap rails	16.50 to 17.00
Hydraul. comp. sheets	14.50 to 14.75
Hand bundled sheets	12.00 to 12.50
Drop forge flashings	14.25 to 14.50
No. 1 busheling	15.50 to 16.50
Hvy. steel axle turnings	14.00 to 14.50
Machine shop turnings	9.00 to 9.50
No. 1 railroad wrought	13.00 to 13.50
Acid Open-Hearth Grades:	
Knuckles and couplers	19.50 to 19.75
Coil and leaf springs	19.00 to 19.50
Rolled steel wheels	19.00 to 19.50
Low phos. billet and bloom ends	20.00 to 20.50
Electric Furnace Grades:	
Short shov. steel turnings	12.50 to 13.00
Blast Furnace Grades:	
Short mixed borings and turnings	11.50 to 12.25
Cast iron borings	11.50 to 12.25
No. 2 busheling	10.00 to 10.50
Rolling Mill Grades:	
Steel car axles	18.75 to 19.25
Iron axles	21.00 to 22.00
Cupola Grades:	
No. 1 machinery cast	16.00 to 17.00
Stove plate	13.00 to 13.50
Locomotive grate bars	12.50 to 13.00
Steel rails, 3 ft. and under	19.50 to 19.75
Cast iron carwheels	14.00 to 14.50
Malleable Grades:	
Industrial	18.00 to 18.50
Railroad	18.00 to 18.50
Agricultural	18.00 to 18.50
Special Grades:	
Chemical borings	12.50 to 13.50

Warehouse Prices, f.o.b. Buffalo

	Base per Lb.
Plates and struc. shapes	3.40c.
Soft steel bars	3.30c.
Reinforcing bars	2.95c.
Cold-fin. flats, sq. and hex	4.45c.
Rounds	3.95c.
Cold-rolled strip steel	5.85c.
Black sheets (No. 24)	4.20c.
Galv. sheets (No. 24)	4.85c.
Blue ann'l'd sheets (No. 10)	3.50c.
Com. wire nails, base per keg	$3.60
Black wire, base per 100 lb.	3.75

Railroad Equipment

Santa Fe To Buy 5754 Cars, Southern 2000 or More—Outlook Improved

WITH the announcement that the Atchison, Topeka & Santa Fe will buy 5754 freight cars and that the Chesapeake & Ohio will shortly come into the market for a large number of cars, together with an inquiry from the Southern for 2000 cars and the possibility that double this number may be purchased, the outlook for railroad equipment buying over the remainder of the year is more promising.

Orders so far this year placed with car builders total about 61,700, including 1000 just placed by the Central of Georgia, but not including 1000 car bodies ordered a few days ago by the Norfolk & Western. In addition to orders placed with car builders, railroads have arranged this year for the building of 9000 cars in their own shops.

Deliveries of cars so far this year by car companies total about 10,000 above those completed during the same period of 1928.

Details of the week's business follow:

Atchison, Topeka & Santa Fe is asking for prices on 3500 box cars, 500 automobile cars, 500 refrigerator and 200 stock cars, 300 mill type gondola cars, 150 flat and 100 tank cars, 104 cabooses, 200 ballast and 200 gondola cars.

Akron & Barberton Belt Railway is in the market for three 6-wheel switching locomotives.

Chicago & North Western is in the market for 500 flat cars.

Chesapeake & Ohio is expected to come into the market shortly for a large number of cars.

Central of Georgia has ordered 500 gondola cars and 500 flat cars from Pullman Car & Mfg. Corporation to be built at the latter's new shop at Birmingham.

Norfolk & Western has ordered 1000 steel hopper car bodies from Virginia Bridge & Iron Co. Action has not yet been taken on the 2000 hopper cars for which this road is in the market.

Southern Railway has inquired for 1000 box cars and 1000 hopper cars, but may buy twice this number.

Dupont Co. is inquiring for 45 alcohol cars.

South African Railways are in the market for 150 50-ton freight cars.

Reinforcing Steel

Awards and Inquiries Are Unusually Light

OF the 2400 tons of reinforcing steel lettings in the past week, 500 tons will be required for an industrial plant at Buffalo. New jobs for which bids are being asked total less than 1000 tons. Four hundred tons will be used for a stadium at Notre Dame, Ind. Awards follow:

STATE OF NEW JERSEY, 300 tons, highway bridges, to Igoe Brothers.

PHILADELPHIA, 100 tons, school.

BUFFALO, 500 tons, Buffalo General Electric plant, to local producer.

CLEVELAND, 100 tons, Flora Mather House for Western University, to Bourne-Fuller Co.

FINDLAY, OHIO, 100 tons, Ohio Oil Co., to Bourne-Fuller Co.

CHICAGO, 350 tons, department store for A. E. Anderson, to Olney J. Dean & Co.

CHICAGO, 150 tons, factory for Oscar Wolff, to an unnamed bidder.

CHICAGO, 100 tons, garage on Crosby Street, to Calumet Steel Co.

CHICAGO, 275 tons, apartment building at 1530 North State Street, to Concrete Steel Co.

NILES CENTER, ILL., 100 tons, paving, to Concrete Steel Co.

HENRYETTA, OKLA., 105 tons, project for Rust Engineering Co., to Truscon Steel Co.

JUNEAU, ALASKA, 350 tons, post office, to Concrete Steel Co.

JUNEAU, ALASKA, 200 tons, United States territorial building, to Concrete Steel Co.

Reinforcing Bars Pending

Inquiries for reinforcing steel bars include the following:

NEW YORK CENTRAL RAILROAD, 150 tons, viaduct at 241st Street, New York.

BUFFALO, tonnage unstated, building for *Buffalo Courier Express.*

NOTRE DAME, IND., 400 tons, stadium for University of Notre Dame.

PORTLAND, ORE., 127 tons, west approach, St. John's River bridge; bids opened.

SACRAMENTO, CAL., 285 tons, paving work in Sonoma and Marin Counties; bids opened.

The number of electric hoists ordered in August dropped 13.3 per cent from the July number, but the value increased 6.2 per cent.

Non-Ferrous Metal Markets

Copper Quiet But Firm—Tin Inactive and Weak—Lead and Zinc Firm

NEW YORK, Sept. 17.

Copper.—Following the heavy sales of more than 100,000 tons to domestic consumers for the week ended Sept. 7, noted in this column a week ago, the market has turned quiet. Sales to domestic consumers the past week have been made practically every day in fair tonnages. Consumers are reported to be well covered into November and, as indications seem to point to a stabilized price of copper for some time to come, some are buying only what their needs justify. Foreign consumers are purchasing more liberally and sales have been in good volume almost every day. They are not covered far ahead and still have considerable to buy for September and October. After the impending prospect of higher prices a week ago which did not materialize, the market has continued at the steadfast price of 18c. for electrolytic copper, delivered in the Connecticut Valley. The quotation of Copper Exporters, Inc., is maintained at 18.30c., c.i.f. usual European points. In accordance with the expectations of some well-posted on conditions, the statistics for August showed an increase in copper above ground of about 9000 tons; of this 7000 tons was refined metal and 2000 tons was blister copper. Output at the mines changed very little in August from July. Lake copper is also strong and steady at 18c. to 18.12½c., delivered.

Tin.—Conditions noted a week ago continue. Dullness is pronounced and business is at a standstill. Something less than 500 tons of spot Straits tin was sold during the week ended Sept. 14. The only metal being sold is for spot delivery, prices for which have hardly varied during the last week. Yesterday and today there has been no activity and spot Straits tin is quoted very weak at 45c., New York. Prices at London are a little higher this week than last, with spot standard quoted at £205 7s. 6d., future standard at £209 5s. and spot Straits at £209 7s. 6d. The Singapore market today was £214 7s.

Lead.—After the heavy buying of two weeks ago the market has been quiet, but demand has been fairly good. Purchasing has not extended beyond October, although there is some inquiry for November. Prices are very firm at 6.70c., St. Louis. The

THE WEEK'S PRICES, CENTS PER POUND FOR EARLY DELIVERY

	Sept. 17	Sept. 16	Sept. 14	Sept. 13	Sept. 12	Sept. 11
Lake copper, New York	18.12½	18.12½	18.12½	18.12½	18.12½	18.12½
Electrolytic copper, N. Y.*	17.75	17.75	17.75	17.75	17.75	17.75
Straits tin, spot, N. Y.	45.00	45.42½	45.37½	45.37½	45.25	45.37½
Zinc, East St. Louis	6.80	6.80	6.80	6.80	6.80	6.80
Zinc, New York	7.15	7.15	7.15	7.15	7.15	7.15
Lead, St. Louis	6.70	6.70	6.70	6.70	6.70	6.70
Lead, New York	6.90	6.90	6.90	6.90	6.90	6.90

*Refinery quotation; price ¼c. higher delivered in the Connecticut Valley.

Rolled Products

Prices on rolled non-ferrous products are unchanged from those prevailing one week ago.

List Prices, Per Lb., f.o.b. Mill

On Copper and Brass Products, Freight up to 75c. per 100 Lb. Allowed on Shipments of 500 Lb. or Over

Sheets—
- High brass ..... 23.25c.
- Copper, hot rolled ..... 26.75c.
- Zinc ..... 10.25c.
- Lead (full sheets) .. 11.00c. to 11.25c.

Seamless Tubes—
- High brass ..... 28.25c.
- Copper ..... 29.25c.

Rods—
- High brass ..... 21.25c.
- Naval brass ..... 24.00c.

Wire—
- Copper ..... 19.87½c.
- High brass ..... 23.75c.

Copper in Rolls ..... 26.75c.
Brazed Brass Tubing ..... 30.87½c.

Aluminum Products in Ton Lots

The carload freight rate is allowed to destinations east of Mississippi River and also to St. Louis on shipments to points west of that river.

- Sheets, 0 to 10 gage, 3 to 30 in. wide ..... 33.00c.
- Tubes, base ..... 42.00c.
- Machine rods ..... 34.00c.

Chicago Warehouse

(Prices Cover Trucking to Customers' Doors in City Limits)

Sheets—	Base per Lb.
High brass	23.25c.
Copper, hot rolled	27.75c.
Copper, cold rolled, 14 oz. and heavier	30.00c.
Zinc	10.75c.
Lead, wide	11.35c.
Seamless Tubes—	
Brass	28.25c.
Copper	29.25c.
Brass Rods	21.25c.
Brazed Brass Tubes	31.00c.

New York or Cleveland Warehouse

Delivered Prices, Base Per Lb.

Sheets—	
High brass	21.12½c. to 22.12½c.
Copper, hot rolled, base sizes	27.75c. to 28.75c.
Copper, cold rolled, 14 oz. and heavier, base sizes	30.00c. to 31.00c.
Seamless Tubes—	
Brass	26.00c. to 27.00c.
Copper	29.12½c. to 30.12½c.
Brazed Brass Tubes	29.12½c. to 30.12½c.
Brass Rods	18.87½c. to 19.87½c.

New York Warehouse

Delivered Prices, Base Per Lb.

Zinc sheets (No. 9), casks	10.50c. to 11.00c.
Zinc sheets, open	11.50c. to 12.00c.

Metals from New York Warehouse

Delivered Prices, Per Lb.

Tin, Straights pig	47.50c. to 48.50c.
Tin, bar	50.00c. to 51.00c.
Copper, Lake	19.50c.
Copper, electrolytic	19.25c.
Copper, casting	19.00c.
Zinc, slab	7.75c. to 8.25c.
Lead, American pig	7.62½c. to 8.12½c.
Lead, bar	9.62½c. to 10.12½c.
Antimony, Asiatic	11.00c. to 11.50c.
Aluminum No. 1 ingots for remelting (guaranteed over 99% pure)	25.00c. to 26.00c.
Alum. ingots, No. 12 alloy	24.00c. to 25.00c.
Babbitt metal, commercial grade	25.00c. to 35.00c.
Solder, ½ and ½	30.00c. to 31.00c.

Metals from Cleveland Warehouse

Delivered Prices, Per Lb.

Tin, Straits pig	50.50c.
Tin, bar	52.50c.
Copper, Lake	19.50c.
Copper, electrolytic	19.25c.
Copper, casting	18.75c.
Zinc, slab	7.75c. to 8.00c.
Lead, American pig	7.55c. to 7.75c.
Lead, bar	9.75c.
Antimony, Asiatic	16.00c.
Babbitt metal, medium grade	18.75c.
Babbitt metal, high grade	54.00c.
Solder, ½ and ½	31.25c.

Old Metals, Per Lb., New York

Buying prices represent what large dealers are paying for miscellaneous lots from smaller accumulators and selling prices are those charged customers after the metal has been properly prepared for their uses.

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	14.75c.	16.25c.
Copper, hvy. and wire	14.50c.	15.75c.
Copper, light and bottoms	12.50c.	13.75c.
Brass, heavy	8.50c.	9.50c.
Brass, light	7.50c.	8.50c.
Hvy. machine composition	12.00c.	13.00c.
No. 1 yel. brass turnings	9.75c.	10.50c.
No. 1 red brass or compos. turnings	11.25c.	12.25c.
Lead, heavy	5.25c.	5.75c.
Lead, tea	4.25c.	5.25c.
Zinc	3.50c.	4.25c.
Sheet aluminum	14.00c.	16.00c.
Cast aluminum	12.25c.	14.25c.

quotation of the leading interest is unchanged at 6.90c., New York.

Zinc.—Consumers still refrain from covering their needs even for fairly early shipments, and producers decline to lower prices which continue at 6.80c., East St. Louis, or 7.15c., New York, for prime Western zinc. It is confidently expected that, if this stand-off continues long enough, there will be a rush to buy similar to that in copper two weeks ago, but of course not so spectacular as to volume.

Antimony.—Demand is very light and Chinese metal is quoted at 8.75c., per lb., New York, duty paid, for all positions.

Nickel.—Wholesale lots of ingot nickel are quoted at 35c. per lb. with shot nickel at 36c. and electrolytic nickel in cathodes at 35c.

Aluminum.—Virgin metal, 98 to 99 per cent pure, is quoted at 23.90c. per lb., delivered, as the published price.

Non-Ferrous Metals at Chicago

CHICAGO, Sept. 17.—This market is quieter than a week ago. Prices, with the exception of tin, which is quoted lower, are unchanged. Demand for old metals is light and prices are not being tested.

Prices per lb., in carload lots: Lake copper, 18.50c.; tin, 46.10c.; lead, 6.80c.; zinc, 6.90c.; in less-than-carload lots, antimony, 9.85c. On old metals we quote copper wire, crucible shapes and copper clips, 14c.; copper bottoms, 11.50c.; red brass, 11.50c.; yellow brass, 8c.; lead pipe, 4.50c.; zinc, 3.25c.; pewter, No. 1, 24.50c.; tin foil, 26c.; block tin, 36c.; aluminum, 12.87½c.; all being dealers' prices for less-than-carload lots.

Fabricated Structural Steel

With Awards of 50,000 Tons and Inquiries of 57,000 Tons, Demand Has Been Well Maintained

WITH total awards of 50,000 tons and with 57,000 tons added to pending work in the past week, demand for structural steel has been well maintained. Most of the jobs let recently and the bulk of fresh inquiries are for office buildings, hotels, educational structures and other non-industrial projects. Outstanding among awards were 8000 tons for a city hall at Buffalo and 5000 tons for bridges on the Great Northern Railway. Much interest has centered on the tonnage required for the Empire State Building, New York. Forty thousand tons is the present estimate, but it is possible that as much as 45,000 tons will be needed. Awards follow:

BOSTON, 350 tons, apartment house on Newbury Street, to New England Structural Co.

LYNN, MASS., 300 tons, theater, to New England Structural Co.

WOBURN, MASS., 180 tons, lighting company substation, to unnamed fabricator.

PROVIDENCE, R. I., 120 tons, United States Rubber Co. plant, to Providence Steel & Iron Co.

NEW YORK, 300 tons, three seaplane hangars for delivery to Brazil, let by Dwight P. Robinson & Co., to Belmont Iron Works.

NEW YORK, 4000 tons, revised estimate for Waldorf-Astoria Hotel above tonnage reported last week, to McClintic-Marshall Co.

NEW YORK, 350 tons, motion picture theater at 151 East Fiftieth Street and passenger station at Tremont Street and Park Avenue for New York Central Railroad, to McClintic-Marshall Co.

VALLEY STREAM, N. Y., 270 tons, airplane hangars, to Jones & Laughlin Steel Corporation.

PALISADES PARK, N. J., 1000 tons, highway bridges, to American Bridge Co.

PHILADELPHIA, 2500 tons, office building and garage, to McClintic-Marshall Co.

PHILADELPHIA, 1400 tons, Architects' Building, to McClintic-Marshall Co.

ATLANTIC CITY, N. J., 2400 tons, Hotel Brighton, to McClintic-Marshall Co.

ATLANTA, GA., 200 tons, hangar for Pitcairn Aviation, Inc., to Virginia Bridge & Iron Co.

TORONTO, 150 tons, community hall at Church and Shuter Streets, to Dominion Bridge Co.

OSHAWA, ONT., 500 tons, factory for Skinner Co., Ltd., to Disher Steel Construction Co., Toronto.

DONNACONA, QUE., 1000 tons, mill for Price Brothers, to Dominion Bridge Co.

BUFFALO, 8000 tons, Buffalo City Hall, to McClintic-Marshall Co.

PITTSBURGH, 300 tons, Maple Terrace viaduct, to McClintic-Marshall Co.

HAMILTON, OHIO, 900 tons, bank building, to Wheeling Structural Steel Co.

NICKEL PLATE RAILROAD, 600 tons, bridge at Cleveland, to Mount Vernon Bridge Co.

PAINESVILLE, OHIO, 300 tons, trestle for Diamond Alkali Co., to American Bridge Co.

BARBERTON, OHIO, 460 tons, Babcock & Wilcox Co., to American Bridge Co.

CHICAGO, 250 tons, Gateway Theater for Balaban & Katz, to Midland Structural Steel Co.

CHICAGO, 150 tons, building for M. Clamitz Co., to Calumet Structural Steel Co., local.

CHICAGO, 2500 tons, garage on Quincy Street, to American Bridge Co.

GREAT NORTHERN, 5000 tons, bridges, to American Bridge Co.

CHICAGO, ROCK ISLAND & PACIFIC, 135 tons, bridge, to American Bridge Co.

MILWAUKEE, 1000 tons, hotel, reported to have been taken by Lakeside Bridge & Steel Co.

STATE OF OKLAHOMA, 2000 tons, highway bridge work, to J. B. Klein Iron & Foundry Co.

REGINA, SASK., 450 tons, technical school, to Manitoba Bridge & Iron Works.

MANSON, WASH., 330 tons, plates, two siphons, to Steel Tank & Pipe Co. of Oregon.

SEATTLE, 400 tons, plates and shapes, taintor gates for Mount Diablo Dam, to Willamette Iron & Steel Co.

SEATTLE, 400 tons, West Garfield Street bridge, to Pacific Car & Foundry Co.

EVERETT, WASH., 10,000 tons, plates, pipe line, to Steel Tank & Pipe Co. of Oregon.

SAN FRANCISCO, 150 tons, apartment building addition, Sacramento and Mason Streets, to Judson-Pacific Co.

SAN FRANCISCO, 325 tons, warehouse for American Can Co., to Judson-Pacific Co.

SAN FRANCISCO, 200 tons, apartment building, Van Ness and Greenwich Streets, to Golden Gate Iron Works.

BERKELEY, CAL., 110 tons, dormitory for University of California, to Pacific Coast Engineering Co.

SALINAS, CAL., 120 tons, bridge over San Lucas River, to United States Steel Products Co.

SAN DIEGO, 200 tons, Herbert Hoover High School, to National Iron Works.

AGUA CALIENTE, MEXICO, 350 tons, grandstand, to Consolidated Steel Corporation, Los Angeles.

OGDEN, UTAH, 145 tons, two bridges in Zion National Park, to Reynolds Ely Construction Co., general contractors.

Structural Projects Pending

Inquiries for fabricated steel work include the following:

LOWELL, MASS., 350 tons, hocky rink.

CONCORD, N. H., 200 tons, State hospital unit.

NEW HAVEN, CONN., 1000 tons, building at Yale University.

STATE OF NEW YORK, 1000 tons, highway bridges.

NEW YORK, 2000 tons, building for American Museum of Natural History.

NEW YORK, 40,000 tons, Empire State Building at Thirty-third Street and Fifth Avenue.

NEW YORK, 1000 tons, highway bridge in Richmond Borough.

HAMILTON, ONT., 1000 tons for McMaster University.

LONDON, ONT., 1000 tons, office building for Huron & Erie Mortgage Corporation.

FLINT, MICH., 2000 tons, bank building.

FLINT, 400 tons, building for Checker Cab Co.

STATE OF OHIO, 100 tons, bridge at Elyria for Highway Department.

CLEVELAND, 150 tons, building for Champion Machine & Forging Co.

CLEVELAND, 300 tons, club house for Catholic Ladies' Slovak Union.

AKRON, OHIO, 3000 tons, Polsky department store.

CLEVELAND, 1000 tons, grade elimination work for Big Four Railroad and Cuyahoga County.

LAKE COUNTY, IND., 850 tons, highway bridges.

ST. LOUIS, 900 tons, for Krey Packing Co.

RIVERSIDE, CAL., 136 tons, grandstand; bids opened.

MONTECITO, CAL., 360 tons, plates, 18-in. welded steel pipe line; bids opened.

PORTLAND, ORE., 335 tons, west approach, St. John's River bridge; bids opened.

VICTORIA, B. C., 500 tons, Thompson River bridge for Provincial Government.

Ludlum Steel Co. announces that all business in the Cleveland district will hereafter be handled from its office at 1593 East Forty-first Street. T. C. Sherman is local manager of the alloy division and W. H. White local manager of the tool steel division, at that address.

PERSONAL

RALPH H. SWEETSER, assistant to the first vice-president of the American Rolling Mill Co., Columbus, Ohio, will read a paper on "Personality in Pig Iron" at the World Engineering Congress in Japan in October. Mr. Sweetser is an authority on pig iron and many present-day practices originated at his furnaces, most important of which are in connection with control and elimination of waste.

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C. E. SMITH, vice-president, New York, New Haven & Hartford Railroad, has been placed in charge of the department of purchases and stores, succeeding N. M. RICE, who died recently. He will continue to assist the president in engineering matters.

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JAMES G. PATTILLO, JR., has been appointed manager of the Pittsburgh sales office of the Wagner Electric Corporation, St. Louis. He is a graduate of the University of Pittsburgh and received further electrical engineering training as a student engineer at the Wagner plant in St. Louis. Later he was transferred to Pittsburgh as a salesman, from which position he was promoted to branch manager.

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F. G. HOUSMAN, superintendent of the machinery division of Peck, Stow & Wilcox, Southington, Conn., is to serve on the advisory committee of the Connecticut board of education in matters pertaining to foundry training in State trade schools and in industrial companies.

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H. PAUL CLEAVER has been appointed superintendent of the J. G. Brill Co.'s Philadelphia plant, succeeding O. C. KAHLER who recently resigned for reasons of health. Graduating as a mechanical engineer from the University of Delaware in 1918, Mr. Cleaver became connected with the Harlan plant of the Bethlehem Shipbuilding Corporation, Wilmington, Del. In 1920 he was made general foreman of the car department, and the following year assistant superintendent. In 1926 he joined the engineering staff of the J. G. Brill Co. and later was appointed general foreman. Early this year he became asistant superintendent.

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G. B. SHEERS, for some time associated with the Moltrup Steel Products Co., Beaver Falls, Pa., manufacturer of cold drawn steel, is now identified with the Reliance Mfg. Co., Massillon, Ohio, where he is engaged in special development work.

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ARTHUR T. MOREY, General Steel Castings Corporation, Commonwealth Plant, Granite City, Ill., has been appointed to the Department of Manufactures Committee of the Chamber of Commerce of the United States.

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ALFRED B. EMRICK, for two years branch manager at Pittsburgh for the Wagner Electric Corporation, St. Louis, has been put in charge of a new branch office at 734 Allen Building, Dallas, Tex., with sales jurisdiction over Texas and parts of Louisiana and Arkansas.

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C. L. MILLER, Pittsburgh, formerly vice-president and general superintendent of the American Steel & Wire Co., sailed for Europe on the Bremen last week.

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HARRY E. GROSS, formerly associated with the A. M. Byers Co., Pittsburgh, has joined the sales organization of Thomas J. Llewelyn & Co., 911 Oliver Building, Pittsburgh. This company is engaged in consulting engineering work for steel plants and pipe mills and is also sales representative for the Falls Electric Furnace Corporation, Buffalo; the Harold E. Trent Co., Philadelphia, maker of electric melting pots, and the R. S. Newbold & Sons Co., Norristown, Pa., manufacturer of steel plant equipment.

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W. S. RUGG, vice-president, Westinghouse Electric & Mfg. Co., East Pittsburgh, has been appointed on the committee for the award during the next five years of the Edison medal of the American Institute of Electrical Engineers. The medal, established by the institute of 1909, is awarded for "meritorious achievements in electrical sciences, engineering or arts."

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H. O. K. MEISTER has been appointed assistant general manager of the Hyatt Roller Bearing Co., Newark, N. J. He has been associated with the company for 15 years, first as manager of its Western division at Chicago, then as assistant general sales manager at Newark and later as general sales manager, having held the latter position since 1925.

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W. S. RAWLEY has been appointed sales representative in Indiana and Kentucky for the Oliver Machinery Co., Grand Rapids, Mich.

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W. H. BASSETT, technical superintendent, American Brass Co., Waterbury, Conn., will address the New Haven, Conn., chapter of the American Society for Steel Treating on "Copper and Copper Alloys" at its regular meeting on Sept. 19.

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RUMSEY W. SCOTT, president, American Cable Co., has resigned to become vice-president of the Commercial Investment Trust Corporation, New York. Previous to his connection with the American Cable Co., Mr. Scott was vice-president of the Chemical National Bank of New York and for 17 years was with the Otis Elevator Co.

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E. E. BAKER has been appointed sales manager of the Thomas Laughlin Co., Portland, Me., manufacturer of heavy hardware for marine and industrial uses. He has had wide experience in the marine and hardware fields, including marine design and construction, for the last 16 years. During the war he was with the purchasing division of the Emergency Fleet Corporation, handling the purchase of machinery, boilers and mechanical equipment. For the past seven years he has been engaged in industrial heavy hardware sales activities.

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O. G. NEUMANN has become associated with the sales department of the Inland Steel Co. and will cover parts of Indiana and Michigan, making his headquarters in Chicago. For the past 10 years he has been with the Jones & Laughlin Steel Corporation, at one time as assistant manager of the Cincinnati warehouse and more recently handling both mill and warehouse sales in Indiana.

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CARL E. SOMMER has been elected president of the Majestic Stove Mfg. Co., St. Louis. He has been connected with the company for 34 years. For 16 years he was in the sales department and later successively was secretary and vice-president.

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D. C. TRAVIS, general superintendent, Simmons Co., Kenosha, Wis., metal bed and bed spring manufacturer, has resigned after 27 years of service in the company's mechanical departments and will be succeeded by G. A. SMITH, now general production superintendent. FRANK B. HARMON will be promoted to general production superintendent and PHILLIP HARMON, JR., to assistant superintendent.

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A. M. LEVERICH, Milwaukee, for the past 8 years representative in Wisconsin of Abrasive Co., Philadelphia, manufacturer of grinding wheels, has resigned to become general manager of the new Camden, N. J., plant of the Rundle Mfg. Co., Milwaukee, maker of plumbing supplies and enameled sanitary ware. He was formerly with Dodge Motor Co., Detroit. J. D. BUCKLEY, Birmingham, will succeed Mr. Leverich.

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F. B. CALDWELL, vice-president, Link-Belt Co., Chicago, has resigned on account of ill health. W. C. CARTER, formerly vice-president in charge of production of all the company's plants, will succeed Mr. Caldwell. E.

J. BURNELL, manager of the company's Pittsburgh office, has been appointed sales manager of the Western division with headquarters at Chicago. He has been succeeded at Pittsburgh by NELS DAVIS, formerly of the Chicago sales organization.

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A. W. THOMPSON, formerly president of the Philadelphia Co. and later of the United Gas Improvement Co., both of Philadelphia, has been elected chairman of the board of the McKinney Mfg. Co., Pittsburgh, maker of builders' hardware. J. P. MCKINNEY, JR., who has been vice-president, has been elected president of the company, succeeding W. C. FARR, who remains as treasurer and has also been elected secretary.

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CHARLES E. HILDRETH, formerly of the Whitcomb & Blaisdell Machine Tool Co., Worcester, Mass., and prominent in national machine tool circles until a few years ago, has been made supervisor for the decennial census next year.

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G. GUY JETER, connected for the past 16 years with the transformer division of the General Electric Co., has been transferred from the Pittsfield, Mass., plant to Bridgeport, Conn., where he will be manager of power apparatus sales.

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PERRY W. OLLIVER has been appointed manager of the San Francisco office of the Sullivan Machinery Co., Chicago. He has been with the company since 1914 and for the past eight years has been connected with the El Paso, Tex., office.

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J. F. WULFETANG, for the last ten years manager of raw materials for the Jones & Laughlin Steel Corporation, Pittsburgh, and previously assistant purchasing agent for that company, has become associated with the Hausman & Wimmer Co., Clark building, Pittsburgh, dealer in scrap iron and steel. Before going with the Jones & Laughlin company, Mr. Wulfetang for twenty years was purchasing agent of the Riter-Conley Co., Pittsburgh.

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DR. CARL KOETTGEN, president Verein Deutscher Ingenieure and general director Siemens-Schuckert Works, Berlin, Germany; DR. CONRAD MATSCHOSS, director Verein Deutscher Ingenieure, Berlin, Germany; DR. EMIL PROBST, Karlsruhe, Germany, and MAJOR H. C. E. CHERRY, a British engineer, were guests of honor at a dinner attended by about 50 New York engineers at the Engineers' Club, Thursday evening, Sept. 12. DR. ELMER A. SPERRY, president, American Society of Mechanical Engineers, acting chairman of the American committee for the World Engineering Congress at Tokio, presided and responses were made by several of the guests, who are on their way to Japan. A number of other European delegates to the World Engineering Congress who have arrived this month have been entertained by groups of New York engineers. Most of the visitors will stop off at various industrial centers on their way across the continent to take steamer for Tokio.

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F. W. STICKLES, recently a member of the sales force of H. H. Adams & Co., pig iron brokers, New York, has leased plant at Mystic, Conn., which he will operate as the Capitol Foundry, making special gray iron castings. He formerly operated a foundry under the same name at Hartford, Conn.

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HIBBARD S. GREENE, formerly vice-president in charge of sales of the Barber-Greene Co., Aurora, Ill., has become assistant to the president of the Chain-Belt Co., Milwaukee.

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J. F. SPELLACY, for two years general superintendent of the Steubenville, Ohio, works of the Wheeling Steel Corporation, has resigned and has been succeeded by C. A. KRAL, recently assistant general manager. Before going with the Wheeling Company, Mr. Spellacy was identified with the National Tube Co.

Obituary

GARDNER A. MURFEY, who recently resigned as treasurer of the Browning Co., Cleveland, because of poor health, died suddenly Sept. 13 at Fredonia, N. Y., while returning home from a vacation trip. He was 44 years of age.

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RAY P. MCGRATH, since 1914 manager of the San Francisco office of the Sullivan Machinery Co., Chicago, died on Aug. 25. He had been connected with the company for 22 years, having been associated with the Boston sales office from 1906 to 1914.

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GEORGE M. JOHNSTON, formerly superintendent of the Clinton, Mass., plant of the Wickwire Spencer Steel Co., and recently in the sales department of the company, died Sept. 13 at his home in Clinton at the age of 36. In 1907 he entered the employ of the Clinton Wire Cloth Co., which subsequently was absorbed by the Wickwire interests.

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EDWIN LEWIS EDES, president, Edes Mfg. Co., Plymouth, Mass., died at his home in Plymouth on Sept. 3 at the age of 76. He was born in Plymouth and early in life became associated in business with his father, who had set up one of the first zinc rolling mills in this country. After his father's death he became sole proprietor and in 1893 organized the Edes Mfg. Co., which continued the zinc business, the principal product being zinc engraving plates.

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RICHARD H. VERIAN, for 44 years president of the Enterprise Foundry Co., Rochester, N. Y., died at his home Sept. 9 at the age of 74. Born in Rochester, he entered the foundry business as a boy and in 1884 organized the firm of which he was the head until his death.

Consider Weirton Merging With Detroit Companies

Executives of the Weirton Steel Co., Weirton, W. Va., the Michigan Steel Corporation and the Great Lakes Steel Corporation of Detroit and the M. A. Hanna Co., Cleveland, recently held a meeting in Cleveland at which a consolidation of the companies was discussed.

The new plant of the Great Lakes Steel Corporation at Ecorse, a suburb of Detroit, is now under construction. It will have an annual capacity of about 400,000 to 500,000 tons of steel ingots and its finished products will be hot and cold-rolled strip steel. The plant is expected to be ready for operation in the fall of 1930.

The Great Lakes Steel Corporation was organized by a syndicate headed by George R. Fink, president of the Michigan Steel Corporation, who is also president of Great Lakes. Authorized capital was $50,000,000, of which $20,000,000 was privately subscribed. The M. A. Hanna Co., became financially interested in the venture and also contracted to supply the plant with hot metal from one of its blast furnaces near Ecorse, Mich.

Capacity operations throughout the remainder of the year are indicated, according to a report from Aluminum Industries, Inc., Cincinnati. Consolidation of the company's two branches in San Francisco into one warehouse in the center of the automobile district in the Golden Gate city has been effected.

The profits showing of this year has been examined for 916 companies by the National City Bank, New York. For the first six months the profits amounted to $2,449,907,000, or 27.4 per cent more than the $1,924,264,000 for the first six months of 1928. One group, leather, reported a deficit. Shipping made the best showing, 179 per cent increase, and the next was iron and steel, 102 per cent for 35 companies ($189,209,000 in 1929 and $93,450,000 in 1928). The increase for 21 automobile companies was 4.1 per cent but for 40 automobile accessory companies, 62.4 per cent.

Acme Equipment Co., Inc., Detroit, has removed to its new offices and warehouse at 3352 Michigan Avenue.

Exhibitors and Products to be Shown at Machine Tool Exposition

(*Continued from Page* 743)

saw blades; Atkins hacksaw frames. Represented by: E. C. Atkins, production manager; W. A. Atkins, works manager; Edward S. Norvell, manager metal saw department; W. R. Chapin, metallurgist; M. M. Poole, purchasing agent; D. M. Condit and A. Mertz, salesmen.

Automatic Nut-Thread Corporation, 3617 North Eighth Street, Philadelphia, Pa. Booth 3W 2.

No. 2 and No. 3 Threadnut full automatic nut tapping machines; No. 1 single spindle tapping machine, full automatic; No. 1 hand tapping machine, single spindle; No. 7 single spindle semi-automatic. Represented by: Eric M. deSherbinin, president; Christian S. Sorenson, general manager; Robert B. Webster, secretary-treasurer; Edward H. Ingram, engineer; LeRoy J. Mickle, superintendent.

Avey Drilling Machine Co., Cincinnati. Booth 1A 6.

High-speed sensitive drilling and tapping equipment; drilling units; metal cutting saws; compensating jaw vises. Represented by: L. B. Patterson, president; J. G. Hey, vice-president and general manager; D. A. Patterson, secretary; J. F. Mirrielees, superintendent; F. L. Hazledine and G. M. Galt, factory representatives.

B

Baker Brothers, Inc., Toledo, Ohio. Booth 2B 13.

No. 121 Baker heavy-duty vertical drilling machine with Tex-Rope motor drive; No. 25 H Baker vertical hydraulic feed five spindle six station indexing table drilling and boring machine; No. 25 HH Baker two way hydraulic feed drilling and boring machine; No. 10 H Baker vertical hydraulic feed drilling machine with adaptation for multiple heads; individual motor-driven collant pump outfit. Represented by: H. L. Tigges, W. W. Elliott, William Baker, G. E. Hallenbeck, M. Fischer, G. Temple.

Baker-Raulang Co., 2168 West Twenty-fifth Street, Cleveland. Booth 4W 6.

Model E3 3-ton elevating truck equipped with 1-ton swivel hoist; Model H3 3-ton Hy-lift truck. Represented by: Glen E. Guy, C. H. Reinde, B. C. Hooper, C. H. Warren.

Barber-Colman Co., Rockford, Ill. Booth 1C 2.

Type B production hobbing machine—a new high production gear generator; No. 3 hob sharpening machine—an automatic mechanically controlled hob and form cutter grinder; reamer sharpener—an automatic machine for highly accurate work under positive mechanical control; small tools; hobs, milling cutters, reamers. Represented by: F. G. Hoffman, G. A. DeVlieg, A. B. Brand, J. P. Breuer, R. P. Dewey, M. N. Hough, C. C. Seyfferle, W. W. Dickover, J. E. Wood, F. R. Ridgley, W. M. Hoey.

Barnes Drill Co., Rockford, Ill. Booth 2D 4.

No. 214 multiple cylinder honing machine with hydraulically reciprocated spindles, all geared, self-oiling, all ball bearing; No. 249 self-oiling all geared honing machine with Timken roller bearings and eight quick changes of speeds; No. 242 self-oiling all geared drill and tapper with Timken roller bearings; two spindle No. 242 self-oiling all geared gang drill with Timken roller bearings; No. 221½ self-oiling all geared drill and tapper; No. 262 self-oiling all geared drill and tapper. Represented by: J. E. Andress, president; A. G. Block, secretary; A. M. Johnson, chief engineer; W. M. Fairbairn, production manager; R. M. Andress, purchasing agent; W. G. Nichol and M. C. Hogard, sales department; F. A. Swanson, designing engineer.

W. F. & John Barnes Co., Rockford, Ill. Booth 2B 9.

Horizontal duplex long hole drilling machine; vertical motor-driven Oilgear feed drilling machines; vertical motor-driven Oilgear feed reaming machine with automatic indexing fixture. Represented by: John S. Barnes, V. A. Root, Ralph Billingham, Paul Guirl, William J. Mix, F. G. Vosler.

Leon J. Barrett Co., Worcester, Mass. Booth 1W 13.

Barrett centrifugal oil extractor, model 1200; centrifugal dryer, model 502; centrifugal washer, model 251; Stockbridge heavy-duty back-geared shaper with patented two-piece crank. Represented by: Leon J. Barrett, R. A. Johnson, H. G. Kilbourne, C. B. Laing, N. F. Holter.

John Bath & Co., Inc., Worcester, Mass. Booth 5W 1.

Ground taps; thread gages; ground thread rolling dies; Bath internal micrometers; adjustable plain plug gages. Represented by: John Bath, president; J. Chester Bath, vice-president; Stanley W. Bath, secretary; R. E. Lamb, advertising manager.

Bausch & Lomb Optical Co., Rochester, N. Y. Booth 6A 5.

Metallographic microscope; contour measuring projector; optical comparator; toolmakers' microscope; optical drill gage; internal and external profile gage; optical protractor; optical indexing device; (all precision optical instruments for production control). Represented by: I. L. Nixon, manager projection sales; E. G. Koch, projection sales department; George Gallasch, technical bureau; A. Farmer, salesman.

Charles H. Besly & Co., 118 North Clinton Street, Chicago. Booth 2D 6.

No. 6-20-in. double-spindle motor-driven wet disk grinder with power-driven oscillating fixture, four station indexing drum equipped with cam clamping V-blocks for grinding exhaust and inlet valves on both ends simultaneously; No. 309-30-in. vertical spindle motor-driven wet disk grinder with power-driven rotary and semi-automatic feeding fixture for grinding face of universal joint housings; No. 141-20-in.-L type motor-driven disk grinder with Timken bearing rocker-shaft supports; No. 5-18-in.-F type motor-driven disk grinder; Besly Titan bakelite abrasive disks and steel-back abrasive disks. Represented by: Edward P. Welles, L. R. Capes, L. E. Jacobs, C. H. Munch, F. D. Baker, E. W. Hutchinson, J. F. Curns, George Klemp, R. J. Curns, R. W. Young, John Miller, Jr., John Neilson, Frank Lane, E. O. Powers, Clarence Stephenson, Albert J. Doerman.

Biax Flexible Shaft Co., Inc., 20 East Seventeenth Street, New York. Booth 5A 6.

Screw driving machine; drilling machines; portable flexible shaft grinders; rotary filing machines; rotary files; high-speed grinders for die work; portable sanding and polishing machines; portable track grinders. Represented by: R. Wezel, F. I. VanderBeek.

Black & Decker Mfg. Co., Towson, Md. Booth 4B 1.

Universal portable electric tools; high cycle portable electric tools; Marschke grinders and Marschke swing frame grinders. Represented by: W. C. Allen, R. D. Black, R. E. Mizener, G. M. Buchanan, A. M. York, Lee H. Hind, Gus Fischer, Ralph Herrick, J. A. Fairfield, Luke Boyd, W. J. Fenwick, W. T. Johnston, Guy J. Coffey, C. C. Watts, W. S. Talbott.

G. S. Blakeslee & Co., Chicago. Booth 4C 3.

Blakeslee pump type parts washing machine; Niagara type parts washing machine. Represented by: John Dammers, secretary; H. A. Sparrow, G. W. Anderson and A. S. Reichel, sales engineers.

Blanchard Machine Co., Cambridge, Mass. Booth 1W 5.

Blanchard automatic surface grinder No. 16-A; 18-in. segment wheel; silicate wheels and segments; samples of Blanchard grinding. Represented by: Harold F. Skillings, Harold C. Donovan, Leon S. Kinsman, William H. Cannon.

J. G. Blount Co., Everett, Mass. Booth 1W 2.

Motor grinders—regular and high speed—tool or snagging; combination motor grinder and disk sander for pattern shops; wet tool grinders; motor buffers; pattern maker's lathe—eight speeds, motor drive. Represented by: H. N. Blount, sales manager; J. G. Blount, production manager; F. G. Koppenburg, factory superintendent.

Bowen Products Corporation, Auburn, N. Y. Booth 5A 7.

Bowen system of lubrication for industrial machinery. Represented by: George W. Severson, Willis S. Meeks, Fred Whipple, E. Heilbron.

Boye & Emmes Machine Tool Co., Cincinnati. Booth 3W 7.

16 in. x 6 ft. coneless geared-head lathe; 16 in. head only. Represented by: F. W. Boye, Jr., F. C. Reif, George A. Mohr, shop superintendent.

Bradford Machine Tool Co., Cincinnati. Booth 2A 4.

18-in. Bradford all geared patented Lo-Drive motor-driven engine lathe, with taper turning attachment and oil pan; single spindle automatic unit type Bradford drilling machine for high-speed automatic production. Represented by: Samuel S. Williams, president; Charles J. Smith, secretary; Henry Swift, engineer; Charles Stiefvater, demonstrater; Fred Kropf, superintendent.

Bridgeport Safety Emery Wheel Co., Bridgeport, Conn. Booth 1A 5.

86-in. type No. 94 heavy-duty face grinder, 42-in. sectional grinding wheel, hydraulic table drive; 20-in. steel chuck and sectional grinding wheel. Represented by: H. H. Peck,

secretary; L. I. Burritt, sales manager; F. C. Penny, chief engineer; H. E. Smith, sales engineer.

Brown & Sharpe Mfg. Co., Providence, R. I. Booth 2C 8.
No. 2A standard universal milling machine; No. 4B standard plain milling machine; No. 2 standard vertical spindle milling machine; No. OY plain milling machine; No. 21 automatic milling machine; No. 2 universal grinding machine; No. 13 universal and tool grinding machine; Nos. 11, 30 and 32 plain grinding machines; No. 2 surface grinding machine; No. 00G automatic screw machine (high speed); No. 2 automatic screw machine (high speed); machinists' tools, cutters and hobs. Represented by: J. G. Swinburne, L. Goff, R. W. Blakey, H. R. Johnson, R. Martines, E. S. Thurston, S. H. Sloan, J. H. Devlin, F. L. Pritchard, P. A. Topel, E. H. Anthony.

Bryant Chucking Grinder Co., Springfield, Vt. Booth 2B 12.
No. 24 deep hole grinder with hydraulic slide traverse and automatic sizing; No. 12-A hole-face grinder; No. 3 heavy duty hole grinder; No. 3 standard hole grinder. Represented by: L. C. Gilchrist, W. L. Bryant, M. H. Arms, J. B. Johnson, R. O. Perry, W. M. Smith, G. M. Green, H. G. Nourse, A. G. Fairbanks.

Buckeye Portable Tool Co., Dayton, Ohio. Booth 4A 1.
Portable pneumatic grinders, buffers, drills, sanders, screwdrivers, nut drivers. Represented by: W. W. Price, president; H. O. Gummere, special representative; C. W. Overly, Cleveland district manager; W. R. Gummere, special representative.

Buffalo Forge Co., Buffalo. Booth 1A 4.
Power drills; power bending rolls; combination punches and shears, fans and exhausters, all in operation. Represented by: H. W. Wendt, Jr., vice-president; E. G. Leonard, sales manager tool division; G. H. Zimmer, design engineer; T. A. Weager, manager Cleveland office; A. T. Yates, service engineer; H. H. Weber, J. E. Mossell, R. L. Pope, W. J. McDowell and A. T. Lamb, sales representative.

Buhr Machine Tool Co., Ann Arbor, Mich. Booth 2D 7.
Buhr multihead automatic drilling machines and automatic index tables; Buhr automatic piston drillers; Buhr drilling and tapping heads; Buhr universal adapters and drivers for drill presses. Represented by: Joseph F. Buhr, president; C. A. Birkebak, chief engineer; Glenn D. Evans, sales manager; Robert S. Gott, works manager; William H. Nicholls and Raymond Zoll, sales engineers.

Bullard Co., Bridgeport, Conn. Booth 1B 1.
8-in. Mult-Au-Matic center lathe; 6-in. four-spindle Mult-Au-Matic chucking lathe with hopper feed; 20-in. Auto-Matic vertical turret lathe; 36-in. "Spiral Drive" type vertical turret lathe. Represented by: E. P. Bullard, president; John W. Bray, sales manager; E. P. Blanchard, assistant sales manager; John R. Tillman, executive sales engineer; Charles H. Keller, F. S. Lincoln, Frank E. Hatch, Jr., James M. Welch, George F. Kolb, F. A. Thompson, Robert Newman, William A. Conner, sales representatives.

C

Canedy-Otto Mfg. Co., Chicago Heights, Ill. Booth 5C 10.
Multiple spindle floor drill, motor driven; high-speed motor driven drill press; 21-in., 17-in., 14-in., 15-in. sliding head motor-driven drill presses (all floor drills). Represented by: C. H. Thomas, president; J. E. Thomas, secretary and treasurer; C. L. Hughes, sales manager; G. F. Werth, chief engineer; F. L. Cole, factory manager; R. D. Thomas, W. F. Wendel, L. H. Howard.

Carboloy Co., Inc., 350 Madison Ave., New York. Booth 4A 2.
Carboloy cutting tools for high production machining of ferrous, non-ferrous and abrasive metals and materials; dies for wire drawing and extrusion work for routine high tonnage production in wire mills. Represented by: P. R. Mallory, president; E. H. Wilkinson, vice-president; A. R. Howell, sales manager; G. V. Rockey, advertising manager; G. N. Sieger, metallurgist; A. A. Merry, W. G. Robbins, W. W. Fullager, W. J. Lindner, P. Petroff, W. H. Martin, W. S. Huson, W. G. Lane, W. E. Smith, S. C. Lawson.

Carlton Machine Tool Co., Cincinnati. Booth 2B 2.
3-ft. 11-in. column Carlton all ball bearing, heavy-duty radial drilling machine arranged for constant speed motor drive on arm, with plain box table and cutting lubricant outfit; 6-ft. 19-in. column Carlton all ball bearing heavy-duty radial drilling machine arranged for adjustable speed motor drive on arm, with plain box table, electric hydraulic column binder, motor-driven cutting lubricant outfit, power rapid traverse of head. Represented by: Jack C. Carlton, Harry J. Westmeyer, Herbert D. Keeling, Frank Moran, W. A. Dermody, Albert C. Spangenberg, A. F. Medecke.

Chicago Belting Co., 113 North Green Street, Chicago. Booth 5W 7.
Motor drive belts; flexible idler belts; line and counter shaft belts; charts on belt ratings and belt properties; leather belting; hydraulic and pneumatic leathers; leather packings; leather tannages; motion picture illustration of how leather belt is made. Represented by: J. R. Hopkins, Floyd Hance, Charles Allis Ball, A. J. Weis.

Chisholm-Moore Hoist Corporation, Tonawanda, N. Y. Booth 6B 6.
Electric hoists and trolleys; chain hoists and trolleys. Represented by: F. W. Shaw, assistant sales manager; J. G. Parker, plant engineer; E. N. Turner, sales engineer.

Cincinnati Bickford Tool Co., Cincinnati. Booth 2A 1.
Radial and upright drills including 6-ft. Super-Service radial with 19-in. column; 3-ft. Super-Service radial with 11-in. column; 21-in. direct drive upright; Super-Service production drill. Represented by: A. H. Tuechter, president; G. P. Gradolf, D. C. Klausmeyer, N. C. Shaver, O. E. Shaver, S. K. Wallace, L. D. Quackenbush, R. N. Piper.

Cincinnati Grinders, Inc. Booth 2C 7.
Plain hydromatic miller; Duplex hydromatic miller; No. 3 Universal miller; No. 3 plain miller; Cincinnati cutter grinder; Cincinnati No. 2 centerless valve tappet grinder; No. 2 centerless piston pin grinder; No. 4 centerless bearing race grinder; 14 x 48 plain cylindrical grinder. Represented by: F. A. Geier, F. V. Geier, P. O. Geier, W. W. Tangeman, F. B. Heitkamp, R. E. W. Harrison, G. W. Binns, J. E. Caster, L. Nenninger, Hans Ernst, M. R. Romaine, E. G. Roehm, R. L. Morrissey, Nelson Caldwell, S. E. Bergstrom, E. Reiniger, S. R. Howells, R. E. Fields, Howard Pope, W. F. Stegner, Carl Mueller.

Cincinnati Lathe & Tool Co., Cincinnati. Booth 2W 18.
16-in. x 6-ft. Cincinnati geared-head lathe for tool room work; 24-in. x 10-ft. geared-head lathe, motor drive, with square turret attachment for severe duty work. Represented by: W. C. Heindel, W. J. Anderson, E. C. Cummings, K. I. Clisby, A. C. Meier, George Doll, William Fisgus.

Cincinnati Milling Machine Co., Cincinnati. Booth 2C 7.
Plain hydromatic miller; Duplex hydromatic miller; No. 3 Universal miller; No. 3 plain miller; Cincinnati cutter grinder; Cincinnati No. 2 centerless valve tappet grinder; No. 2 centerless piston pin grinder; No. 4 centerless bearing race grinder; 14 x 48 plain cylindrical grinder. Represented by: F. A. Geier, F. V. Geier, P. O. Geier, W. W. Tangeman, F. B. Heitkamp, R. E. W. Harrison, G. W. Binns, J. E. Caster, L. Nenninger, Hans Ernst, M. R. Romaine, E. G. Roehm, R. L. Morrissey, Nelson Caldwell, S. E. Bergstrom, E. Reiniger, S. R. Howells, R. E. Fields, Howard Pope, W. F. Stegner, Carl Mueller.

Cincinnati Shaper Co., Cincinnati. Booth 2W 17.
16-in. heavy-duty Cincinnati rapid traverse shaper equipped with universal table; 24-in. heavy-duty Cincinnati rapid traverse shaper; Cincinnati gear burnisher; shaper parts and assemblies. Represented by: H. S. Robinson, R. T. Hazelton, T. H. Schebrat, M. A. Spraley, George Diehl, Frank T. Goetz, F. G. Swain.

Cleveland Automatic Machine Co., 2269 Ashland Road, Cleveland. Booth 2C 5.
½-in. model M five spindle bar machine with independent feed control for all tools; ⅞-in. model M four spindle multiple drilling, forming and cut-off machine, blanking four nuts simultaneously from the bar; 7-in. model M five spindle chucking machine for castings, forgings or stampings. Represented by: A. L. Garford, president; H. W. Rupples, general manager; H. M. Rich, secretary-treasurer; C. W. Cowdrey, sales department; Herbert E. Nunn, B. C. Young, A. W. Schafer, W. Steinbrenner, G. W. Samstag, Arthur Jackson.

Cleveland Hobbing Machine Co., 1170 East 152nd Street, Cleveland. Booth 1A 10a.
Eight spindle rotary hobbing machine. Represented by: C. W. Blossom, president; W. H. Staples, vice-president and general manager; F. H. Adams, vice-president.

Cleveland Planer Co., 3148 Superior Avenue, Cleveland. Booth 1C 3.
Cleveland open side planers. Represented by: E. L. Essley, president; E. P. Essley, secretary; L. H. Mesker, sales manager; J. Jenne, works manager.

Cleveland Twist Drill Co., 1242 East Forty-ninth Street, Cleveland. Booth 4W 11.
Drills; reamers. Represented by: W. E. Caldwell, H. P. Jenson, J. B. Dillard, T. M. Skove, D. D. Burdett, H. J. Baier, R. G. Berrington, H. G. Smith, F. M. Hoelzle, A. J. Ireland, O. B. Hansen, R. D. Boltey.

Cochrane-Bly Co., Rochester, N. Y. Booth 2C 12.
No. 66 metal sawing machine with hydraulic feed and air clamp; No. 55 metal sawing machine with air clamp and multiple cutting fixtures; No. 21 automatic high-speed saw with power stock feed; No. 2 filing machine; No. 11 saw sharpening machine; No. 14 duplex shaper-miller. Represented by: W. H. Welch, vice-president; T. M. Crandall, secretary-treasurer; Bracket Clark.

Colonial Tool Co., 8432 Butler Ave., Detroit, Mich. Booth 5A 4.
Michigan Tool Co. milling cutters, hobs, gear-shaper cutters, special tools; Colonial Tool Co. round, spline, and combination round-and-spline broaches; spline gages. Represented by: Otto Lundell, president and general manager, Michigan Tool Co.; O. L. Bard, secretary, Michigan Tool Co.; J. W. Mull, Jr., sales manager, Michigan Tool Co.; C. J. Halborg, general manager, Colonial Tool Co.; E. H. Kurtz, sales manager, Colonial Tool Co.

Columbia Machine Tool Co., Hamilton, Ohio. Booth 2W 15.
Columbia 24-in. superior heavy-duty back geared crank shaper with speed box, friction clutch and brake and constant speed motor drive; vertical chucking machine of complete new design. Represented by: F. B. Yingling, E. S. Rich, F. Fiesselmann, O. G. Tweddell.

Conradson Tool Corporation, 2116 Indiana Avenue, Chicago. Booth 4A 3.
Shell reamers; expansion reamers; arbors; milling cutters. Represented by: W. J. Denning, Stephen Carboy, F. J. McHugh.

Consolidated Machine Tool Corporation of America, Rochester, N. Y. Booth 2C 4.
Heavy-duty boring mill; cold saw; milling machine; small tools for threading. Represented by: A. H. Ingle, Alfred Trosch, W. C. Ingle, H. M. Bowman, R. R. Roberts, W. J. Forward, H. A. Merrill, R. S. Laird, A. Myers, L. T. Jefferis, C. E. McArthur, C. R. Williams, S. A. Harding, P. L. Johnston, G. C. Bailey.

Covel-Hanchett Co., Big Rapids, Mich. Booth 2A 9.
Two-spindle horizontal grinding machine; face grinding machine, 20-in. wheel; large size double-spindle machine with special fixtures; combination face grinding and locomotive guide bar grinder; vertical spindle machine; automatic surface grinder; universal cutter and tool grinder; small size surface grinder; twist drill grinders; small size metal saw sharpening machine; large size metal saw sharpening machine. Represented by: E. B. Gardner, A. M. Johnson, W. S. Paden, Ed. Ellefson, L. H. Benjamin.

Cushman Chuck Co., Hartford, Conn. Booth 5B 2.
Collet chucks; dust-proof chucks; new pattern lathe chucks; boring mill jaws. Represented by: Harry E. Sloan, president; Harry W. Hultgren, sales department; James Jordan, superintendent; George Highberg, assistant superintendent.

Cutler-Hammer, Inc., Milwaukee. Booth 6A 1.
A. c. and d. c. automatic motor control; planer control; a. c. and d. c. manual motor control; Across-the-line "X" automatic starters; safety switches; push buttons; accessories. Represented by: A. G. Pierce, Cleveland district manager; F. U. Webster, advertising manager.

D

Danly Machine Specialties, Inc., 2104 South Fifty-second Street, Chicago. Booth 4B 6.
Die makers' supplies: die sets; guide posts; guide bushings; dowel pins; automatic gages; die springs; shoulder screws; socket head cap and set screws. Represented by: R. C. Danly, president; R. H. Danly, vice-president and general manager; J. R. Fitzsimons, manager Cleveland branch; A. L. Miller, manager Long Island City branch; George T. Danly, chief engineer; W. L. Rankin, manager Detroit branch; A. F. Wallace, manager Rochester branch.

DeVlieg Machine Tool Co., Jackson, Mich. Booth 2A 2.
High-powered precision simplified production type milling machine. Represented by: Charles B. DeVlieg, president and general manager; N. S. Lundberg, chief engineer.

DeWalt Products Corporation, Leola, Pa. Booth 6B 5.
DeWalt Wonder Metal Worker for cutting steel tubing; DeWalt Wonder Worker, a combination woodworker; DeWalt jointer; DeWalt mortiser. Represented by: Paul Gardner, president; Robert H. Mulch, general sales manager; Walter Knapp, engineer; L. J. McLaughlin.

Diamond Machine Co., Providence, R. I. Booth 2A 8.
Diamond face grinding machine; Type H surface grinding machine, universal head; continuous grinding machine. Represented by: D. K. Bartlett, A. A. Wood, L. L. Lorey, Morris Slepkow, G. W. Clausson.

Henry Disston & Sons, Inc., Philadelphia. Booth 4B 8.
Metal cutting saws, files and tool steel; a fast running cut-off machine in operation; band saw machine in operation; hack saw machine in operation. Represented by: S. Horace Disston, vice-president; George Satterthwaite, vice-president; H. A. Baxter, general sales manager for steel and metal cutting saws; J. C. Forrest, sales manager for metal saws; Charles Thompson, experimental engineer; H. Allen, chief metallurgist; Normal Bye, chief engineer.

Dreses Machine Tool Co., Cincinnati, Ohio. Booth 2W 12.
3-ft. 11-in. column Multi-duty radial drill. Represented by: C. E. Gilbert, J. Wiebell, superintendent; J. Disser, chief engineer; A. Schlachta, demonstrator.

E

Eastern Machine Screw Corporation, New Haven, Conn. Booth 1W 3.
"H & G" self-opening die heads; high-speed hob chasers; "H & G" threading machine, chaser grinder and feed pushers. Represented by: C. W. Bettcher, sales manager and secretary; O. H. Hoelzel, A. E. Chadwick, H. F. Wieler, B. DePolo, G. E. Mager, J. E. Jennings, F. J. O'Rourke, A. Jackson, J. C. Fletcher, Victor Larson, H. Dobson.

Eclipse Interchangeable Counterbore Co., Detroit. Booth 5B 4.
Counterbores; countersinks; core drills; multi-diameter cutters and special production tools for automotive and airplane motor manufacturers; operating demonstration of production tools. Represented by: R. G. Michell, general manager; A. C. Warn, assistant general manager; J. H. Smith, sales manager; U. G. Thomas, factory superintendent; L. N. Hall, Cleveland district manager; O. W. Dawson, G. Sealander and C. M. Bigger, sales representatives.

Economy Engineering Co., Willoughby, Ohio. Booth 1W 15.
$\frac{3}{4}$-in. Economy automatic shaving machine, type S; $\frac{3}{8}$-in. combined automatic pointing and threading machine; $\frac{3}{4}$-in. four-spindle semi-automatic threading machine. Represented by: F. O. Andrews, president; F. S. Andrews, assistant president; Louis Steinfurth, chief engineer.

Elwell-Parker Electric Co., 4205 St. Clair Avenue, Cleveland. Booth 6B 1 & 2.
Electric industrial trucks; electric tiering trucks; new Swiss model electric lift trucks; portable electric cranes. Represented by: J. P. Lyons, C. B. Cook, R. F. Crawford.

Ex-Cell-O Aircraft & Tool Corporation, 1200 Oakman Boulevard, Detroit. Booth 5A 9.
Tool steel drill jig bushings; internal grinding spindles; Diesel fuel pump parts; tool detail parts; aircraft engine precision parts. Represented by: N. A. Woodworth, president and general manager; W. F. Wise, sales manager; J. E. Wells, J. F. Hanlon, H. E. Henry.

F

Fafnir Bearing Co., New Britain, Conn. Booth 5W 10.
Line of ball bearings. Represented by: E. R. Carter, H. R. Reynolds, E. B. Hand, W. L. Rager.

Fairbanks, Morse & Co., 900 South Wabash Avenue, Chicago. Booth 5C 9
Sectionalized 25 H. P. squirrel-cage motor; sectionalized clean-air-jacket motor; clean-air-jacketed ball-bearing motor in operation; direct-current ball-bearing motor, a range of various sizes of ball-bearing motors. Represented by: K. W. Jones, J. R. Kindig, H. C. White, J. R. Patterson, Glen H. Corlette, G. J. Podlesak, C. E. McLaughlin, F. M. Gardner, R. L. Johnson.

Farrell-Birmingham Co., Inc., 344 Vulcan Street, Buffalo. Booth 3W 5.
No. 2-A Sykes gear generator; No. 1-A Sykes gear generator; one-tooth pinion stand; gear box of selective type with 40 deg. angle Sykes herringbone gears constantly in mesh; range of Sykes gear tooth comparators. Represented by A. G. Kessler, W. E. Sykes, Austin Kuhns, T. Holloway, H. E. Kitchen, J. Leahy, Paul Manager, John Brandt.

Fellows Gear Shaper Co., Springfield, Vt. Booth 2B 8.
Machines for cutting gears for four-speed transmission gear boxes, including No. 712 high-speed gear shapers for roughing and No. 77 side trimming high-speed gear shaper for finishing; No. 7A drop apron high-speed gear shaper; No. 7A standard high-speed gear shaper for cutting steel gear blanks having a 2-in. face; No. 75 high-speed gear shaper for cutting helical gears; a high-speed gear shaper with a kickoff and reversing attachment for cutting segment gears for a cash register; No. 612A gear shaper for cutting steel gear blanks of 5-in. face width; a thread generator in operation "Red Liner" automatic gear inspection machines; an involute testing machine for inspecting gear shaper cutters. Represented by: E. R. Fellows, president and general manager; E. J. Fullam, secretary and treasurer; R. M. Fellows, purchasing agent; W. F. Slomer, general sales manager; E. W. Miller, chief engineer; E. Stubbs, factory manager; C. C. Bankes, J. B. Strong, C. J. Nagel, F. P. McGrath; Douglas T. Hamilton, advertising manager.

Flather Co., Nashua, N. H. Booth 1W 4.
20 in. x 10 ft. motor driven geared head engine lathe. Represented by: H. L. Flather, president and treasurer; J. H. Flather, vice-president; H. H. Flather, asristant treasurer; J. H. Connor, superintendent.

Foley Mfg. Co., Inc., 11 North East Main Street, Minneapolis, Minn. Booth 6B 3.
Foley automatic saw filers; automatic hack saw grinders;

circular saw grinders; hand saw retoothers; automatic saw setting equipment. Represented by: W. M. Ringer, president; W. F. Rehbock, sales manager; C. H. Carlson, director of production; F. E. Collier, superintendent; G. O. Steen, service manager; W. P. Tobey, Jr., New England sales representative.

Foote-Burt Co., 13000 St. Clair Avenue, Cleveland. Booth 1A 12.

No. 1 surface broaching machine; No. 15½-F six-spindle drilling machine; No. 16 hydraulic feed drilling machine; No. 15½-D drilling machine; No. 22½ high duty drilling machine; BW-23 two-spindle sensitive drilling machine; No. 1¾ two-spindle sensitive drilling machine; DE-1 single-spindle sensitive drilling machine; No. 4½ independent feed drilling machine. Represented by: G. E. Randles, president; T. H. Doan, Jr., vice-president; R. E. Delamater, Ira D. Grove; W. F. Babcock, Detroit representative; David F. Noble, Chicago representative; Herbert Kennedy, Eastern representative.

Fosdick Machine Tool Co., Cincinnati. Booth 1A 3.

No. 2 two spindle sensitive drill, 13 in.; No. 4 two spindle sensitive drill, 24 in.; No. 5 three spindle sensitive drill, 16 in.; 6 ft. 19 in. column Economax radial drill. Represented by: N. B. Chace, William C. DeRoo, A. Kuehn.

Foster Machine Co., Elkhart, Ind. Booth 2C 2.

No. 5 all geared head universal turret lathe; 1-F turret type Fastermatic; 3-F platen type Fastermatic; 3-F turret type Fastermatic; 4-F platen type Fastermatic. Represented by: W. H. Foster, president; H. A. Moore, general sales manager; Carl Moser, Jr., Harry Lyon, O. B. Clemens.

Fredericksen Co., Saginaw, Mich. Booth 5W 6.

Spindle bearings; lead screw nuts; miscellaneous machine tool bearings and bushings of Sabeco bearing metal; worm gear castings. Represented by: Arthur A. Schupp, general manager; Henry C. Limbach, sales manager; C. D. Proctor, Ralph H. Sherry, Karl A. Agricola; William L. Agricola, superintendent.

Frew Machine Co., 124 West Venango Street, Philadelphia. Booth 3W 16.

No. 1 automatic tapper; No. 4 hand milling machine; No. 0 Duplex drill; No. 2 automatic tapper. Represented by: George H. Frew, H. Edwards.

G

Gairing Tool Co., Detroit. Booth 4B 2.

Small tools; swing tool boring and facing heads; full floating holders; quick-change floating tap holders; multiple boring and facing cutters; multiple operation core drilling, counterboring and chamfering tools, inserted blade and solid type; Gairing nose drive reamers, inserted blade and solid; inserted blade hollow mills; inverted counterbores; standard counterbore sets for tool room machine shop use; chucking reamers; off-set spot facing heads; grinding fixtures. Standard type A, B and C counterbores and core drills, multiple operation cutters, Gairing full floating holders and nose drive reamers in operation. Represented by: E. Gairing, president; C. E. Wyrick, general manager; B. O'Meara, assistant manager of sales; D. G. Hawksworth, assistant chief engineer; William B. McClellan.

Gallmeyer & Livingston Co., Grand Rapids, Mich. Booth 2B 15.

Grand Rapids hydraulic feed surface grinders, hand feed surface grinders, universal cutter and tool grinders, twist drill grinders, tap grinders, combination twist drill and tap grinders. Represented by: C. H. Gallmeyer, treasurer; S. Owen Livingston, vice-president; B. C. Saunders, secretary; J. DeKoning, engineer.

Gardner Machine Co., Beloit, Wis. Booth 1W 20.

No. 9 40 in. super disk grinder in operation, grinding coils springs; No. 84 special automatic hexagon nut grinder in operation, grinding hex nuts; No. 86, 30 in. horizontal grinder with hand operated swinging work table; No. 3-CB Speed-U-Need polishing lathe; No. 3-DA double spindle Speed-U-Need polishing lathe. Represented by: L. W. Thompson, president; F. E. Gardner, vice-president; W. B. Leishman, treasurer and sales manager; B. H. Pratt, superintendent of service; F. M. Risler, Detroit manager; Harold Prigoff, Eastern manager; H. J. Gaumond, P. L. Watson, W. L. Townsend, H. C. Steinbuck and A. B. Davenport, Jr., sales engineers.

Gaterman Mfg. Co., W., Manitowoc, Wis. Booth 5C 2a.

Pneumatic oscillating tapping machines. Represented by: W. Gaterman, president; E. Gaterman, secretary and treasurer; F. H. Kind, master mechanic.

Gears & Forgings, Inc., 3010 Woodhill Road, Cleveland. Booth 3W 15.

Gears; forgings; reduction units; machine tool parts; transmissions. Represented by: R. B. Tripp, general sales manager; R. K. Plummer, assistant sales manager; C. E. Broome, district sales manager; H. J. Awig, engineer.

General Electric Co., Schenectady, N. Y. Booth 4A 2.

Motors and control applicable to machine tools.

General Radial Drilling Machine Co., 1767 Elmore Street, Cincinnati. Booth 2W 14.

5 ft. 15 in. column hydraulic radial drill; 3 ft. 9 in. column sensitive radial drill. Represented by: R. B. Busch, president; J. Schaffner, chief engineer.

Geometric Tool Co., New Haven, Conn. Booth 1W 21.

Self opening die heads; style D for hand machines; KH for hand machines; DS for Brown & Sharpe automatics; KD rotary heads for live spindles; special purpose tools; collapsing taps receding chaser taps; solid adjustable die heads; solid adjustable taps; threading machines; chaser grinder; chaser grinding fixture. Represented by: James W. Sneyd, vice-president; G. A. Denison, sales manager; P. A. Pritchard, sales engineer; L. G. Spealman, production engineer.

Giddings & Lewis Machine Tool Co., Fond du Lac, Wis. Booth 2C 11.

No. 50 extra heavy table type high pressure power precision horizontal boring, drilling and milling machine. Represented by: C. Gebuhr, R. H. McCormick, A. E. Ulrich, A. L. Carlson, E. E. Wagner.

Gisholt Machine Co., Madison, Wis. Booth 1C 4.

Turret lathes; automatic chucking machines; balancing machines; tool grinder. Represented by: W. J. Hannum, George M. Class, F. M. Long, L. E. Godfriaux, W. I. Senger, C. B. Carr, G. E. Thomas, R. D. Heflin, H. G. Hall, R. E. MacCartney, J. H. Nebel, A. S. Beckman, U. S. James.

Gits Bros. Mfg. Co., Chicago. Booth 5A 8.

Oil cups; oil hole covers; sight feed lubricators; high pressure grease cups; multiple feed oilers; high pressure grease gun and fittings. Represented by: R. J. Gits, president; Frank Zeman, sales manager; J. A. Gits, general superintendent.

Gleason Works, Rochester, N. Y. Booth 1B 4.

3 in. spiral bevel gear generator; 10 in. manufacturing spiral bevel gear generator; 15 in. spiral bevel gear generator; 30 in. spiral bevel and hypoid generator; 4 in. spiral bevel cutter sharpener; 12 in. spiral bevel cutter sharpener; cutter angle testing device; 3 in. straight bevel gear generator; Universal manufacturing bevel gear generator; 12 in. straight bevel gear generator; generator tool grinder; four spindle manufacturing rougher; multiple spindle rougher cutter sharpener; 18 in. combination testing and lapping machine. Represented by: A. L. Stewart, chief engineer; S. H. Earl, works manager; B. H. Bickle, sales manager; F. E. McMullen, chief engineer, gear division.

Goddard & Goddard, Inc., Detroit. Booth 3W 13.

Milling cutters, including special and standard classes in both form and profile type; demonstration of cutting in alloy steel. Represented by: A. N. Goddard, president; E. E. Anderson, works manager; C. S. Goddard, sales manager; William Fritz, superintendent; K. W. Legg and C. H. Wallace, sales engineers; E. E. Guntert, J. Murray, Henry Boggis, E. D. Rummins and Frank Willbrant.

Goss & De Leeuw Machine Co., New Britain, Conn. Booth 1B 3.

6 in. and 11 in. G & DL tool revolving multiple spindle automatic chucking machine; No. 6 work revolving multiple spindle automatic chucking machine. Represented by: Stanley T. Goss, president; Val. C. Hart and J. J. Spring, sales engineers; H. J. Hauck, engineer.

Gould & Eberhardt, Newark, N. J. Booth 1B 6.

No. 9H universal manufacturing gear hobbing machine; 12HS manufacturing gear hobbing machine; 48HS manufacturing gear hobbing machine; 24 in. manufacturing shaper with universal table; 36 in. manufacturing shaper. Represented by: F. L. Eberhardt, president and general manager; H. Ezra Eberhardt, secretary; William F. Zimmerman, chief engineer; Gustave Spies, sales engineer; F. G. Eberhardt, John Duffy, John Allwood, James Craig and Albert Miller, sales representatives.

Greenfield Tap & Die Corporation, Greenfield, Mass. Booth 3W 9.

No. 12 Greenfield high speed internal grinder; No. 1 hydraulic plain grinder; No. 3 motor-in-head cutter and reamer grinder; No. 734 threading machine with automatic opening die head; snap, plain and thread gages; acorn and button dies; ground and cut thread taps; twist drills; screw slotting cutters; reamers; pipe tools. Represented by: W. B. duMont, vice-president in charge of sales; R. B. Hubbell, manager, machine tool department; E. J. Bryant, manager, gage and reamer department; Louis Battey, manager, small tool department; A. M. Drake, chief engineer; F. Judge, general superintendent; C. C. Ziegler, C. H. Coe, B. G. Munyan, A. T. Ritchie, J. K. Penny, A. J. Kiehne, B. F. Butterfield and G. W. Demarest.

Greenlee Brothers & Co., Rockford, Ill. Booth 1B 2.

Four spindle automatic screw machine; multiple spindle

drilling machine. Represented by: G. C. Purdy, president; J. H. Mansfield, chief engineer; A. H. Eggers, sales manager; L. H. Geddes, F. J. Hollem, J. C. Beers.

Gurney Ball Bearing Division, Marlin-Rockwell Corporation, Jamestown, N. Y. Booth 4W 14.

Radial, radio-thrust and thrust ball bearings; head stocks, a valve grinder, vertical electric motors and a reduction unit, all equipped with Gurney ball bearings. Represented by: H. A. Johnston, sales manager; Coleman Darnell, assistant sales manager; A. A. McGowen, advertising manager; O. H. Koelker, D. K. Hatch, sales representatives.

H

Hall Planetary Co., Fox Street and Abbotsford Avenue, Philadelphia. Booth 2W 11.

Type B Planetary full automatic; type A Planetary illustrating various types of threads and bores; type D Planetary in production as internal milling; machinabilameter—a new instrument for testing the machineability of metals. Represented by: P. Hall, G. Stafford, H. C. Sheaffer, H. Leisner.

Hammond Mfg. Co., 7808 Kinsman Road, Cleveland. Booth 5A 2.

Radial drilling and tapping machine; pedestal automatic tapping machine; cabinet base polishing and buffing machine; six spindle hydraulic drilling machine. Represented by: William D. Buss, J. J. Stephens, C. M. Allen, Glenn M. Hood.

Hanna Engineering Works, 1765 Elston Avenue, Chicago. Booth 3W 10.

Hanna rapid riveter—capacity ¼ in. rivets cold; Hanna yoke riveter—capacity ⅝ in. rivets cold; Hanna closed yoke riveter for automobile chassis frame riveting; Hanna turret riveter for automobile chassis frame riveting. Represented by: A. F. Jensen, president; J. C. Hanna, chief engineer; L. F. Weldon, O. F. Weiss, G. B. Lytle and E. J. Charron, sales representatives.

Hannifin Mfg. Co., 621 South Kolmar Avenue, Chicago. Booth 5B 9.

Air operated chucks; air operated arbor presses; air operated rivet presses; air operated work holding fixtures; air operated vises; air control valves; air pressure regulating valves; air operated expanding mandrels; air clutch countershafts; stationary double acting air cylinders; hydropneumatic broaching presses; boring bars; air-operated devices. Represented by: V. W. Peterson, president; J. H. Sipson, assistant general manager; R. A. Bean, H. H. Mercer and E. D. Thompson, sales engineers.

Hanson-Whitney Machine Co., Hartford, Conn. Booth 2B 6.

Universal semi-automatic thread milling machine; universal vertical tool and die shaping machine; rapid precision centering machine; taps, gages, hobs and screws, finished after hardening by the Hanson process. Represented by: J. W. Johnson, C. A. Lauridsen, H. C. Chellman; E. A. Hanson, president; L. B. Reed, general manager; George McPherson, A. G. Brice, H. B. Morrison, E. H. Huntington.

Hardinge Brothers, Inc., Chicago. Booth 2W 7.

Bench lathes and attachments; bench millers; quick-change precision lathe. Represented by: J. F. Griswold, president; Henri E. Nelson, general manager, machine tool division; Henry C. Sharp, director of engineering; Edward A. Iverson, representative.

Heald Machine Co., 10 New Bond Street, Worcester, Mass. Booth 2A 7.

No. 72A-3 Size-Matic internal grinding machine; No. 72A-3 Gage-Matic internal grinding machine; No. 72A-5 airplane cylinder grinding machine; No. 25A rotary surface grinder with 30 in. chuck. Represented by: J. N. Heald, Richard A. Heald, Roger N. Heald, S. T. Massey, W. Guild, R. A. St. John, J. R. Carlson.

Hendey Machine Co., Torrington, Conn. Booth 1D 2.

12 in. x 5 ft. high-speed ball bearing lathe; 12 in. x 5 ft. geared head lathe, taper attachment, oil pan, No. 3 drawing-in attachment; 18 in. x 10 ft. geared head lathe, ball bearing spindle, taper attachment, sub headstock; 16 in. heavy-duty crank shaper; 32 in. heavy-duty crank shaper; No. 12 hydraulic broaching machine. Represented by: S. H. Childs, vice-president and general manager; W. A. Reynolds, assistant to vice-president; A. H. Hall, sales manager; P. H. Buxton, superintendent; C. Bouillon, George Knight, H. Blakeslee and R. J. Peterick, assistant superintendents; W. F. Henly, New York branch manager; F. C. Parman, Rochester branch manager; E. B. Barker, Detroit branch manager; P. W. Rice, Chicago branch manager; R. B. Shaw, Dayton branch manager; F. J. McCarty, special representative.

Henry & Wright Mfg. Co., Hartford, Conn. Booth 2W 4.

Henry & Wright dieing machines (high-speed automatic punch presses); multiple station progressive dies; high-speed multiple spindle sensitive drilling machines. Represented by: J. F. Funk, general manager; C. F. Sherman, chief engineer; J. J. Dale, Western sales manager; R. B. Weeks, C. H. Hamilton, F. H. Spiegel, W. J. Henry.

Higley Machine Co., South Norwalk, Conn. Booth 2W 9.

Higley 8 in. capacity Coldcut sawing machine equipped with screw feed table for feeding heavy bars up to cutting position and swivel type front table with gage stop to handle pieces being cut off and to gage length of pieces. Represented by: L. M. Waite, general manager; I. S. Smith, sales manager; M. H. Waite, service manager.

Hill-Curtis Co., Kalamazoo, Mich. Booth 2W 8.

Electric grinders, bench and pedestal type; belted grinders, bench and pedestal type; electrically driven railroad journal wedge reclaimer; selective speed tool and productive grinders, electric; Rite Speed electric polishing lathe; belted polishing lathe; disk grinders, electric. Represented by: W. C. Hammond, president; W. J. Holtmeier, sales manager; H. J. Kingsbury, chief engineer.

Hisey-Wolf Machine Co., Cincinnati. Booth 2W 22.

Electric drills, grinders, buffers. Represented by: John W. Friedlander, J. E. Hauser, Roy D. Haworth, C. J. Henefelt, Albert Kiefer, George Moerlein, P. A. Rebok, E. Ritz, Jr., T. R. Sanders, H. W. Wallace.

Hoefer Mfg. Co., Freeport, Ill. Booth 2W 1.

5-7½ h.p. production drillers; auxiliary heads. Represented by: Chester A. Hoefer, secretary; Paul Andree, general manager; Ernest Kracht.

E. F. Houghton & Co., Philadelphia. Booth 6B 4.

Microstructure of steels after Society of Automotive Engineers' recommended heat treatment; Houghtoclean for metal cleaning; Hocut for metal cutting; Vim leather belting and leather packings; lubricating oils.

Hyatt Roller Bearing Co., Newark, N. J. Booth 5A 5.

Hyatt bearings for machine tool application; photographic illustration of bearing applications to machine tools ranging from board drop hammers to finishing tools of every kind. Represented by: F. S. Darke, L. L. Hill, W. T. Long, L. F. Stuebe, sales engineers; C. L. Newby, manager, industrial division, Chicago; J. M. Kelly, manager, Pittsburgh sales district; H. M. Carroll, advertising manager.

Hydraulic Press Mfg. Co., Columbus, Ohio. Booth 3W 4.

H-P-M hydro-power press; H.P.M. hi-speed Hydraulic shop press. Represented by: F. B. MacMillin, H. F. MacMillin, P. A. Harlamert, W. Ernst.

I

Illinois Tool Works, 2501 North Keeler Avenue, Chicago. Booth 5C 1.

Milling cutters; hobs; reamers; broaches; ground form tools; die filing machines; tool testing fixtures, Wedgelock tool holders. Represented by: S. O. Bjornberg, P. J. Nelson, A. W. Swanson.

Ingersoll Milling Machine Co., Rockford, Ill. Booth 1C 1.

Ingersoll 4-head adjustable rail heavy pattern milling machine openside milling, boring and drilling machine; face milling cutter grinder; line of Ingersoll standard and special milling cutters. Represented by: Amos A. Braid, Robert M. Gaylord, W. C. Sproul, J. R. Johnson, A. H. Lyon, E. K. Morgan, H. C. Rose, F. J. Malone, J. M. B. Scheele, W. M. Grove, J. M. Macrae, G. L. Bradley, S. W. Fish, Walter Hangartner, Parnell Divine.

International Machine Tool Co., Indianapolis. Booth 1W 16.

1-H 24 x 5¼ in. Libby-International turret lathe with power feed cross slide turret; 3-H 29 x 8¼ in. Libby-International turret lathe with rigid turret. Represented by: O. B. Iles, T. P. Dickinson, Harry Heidergott, Alfred Ruwe.

THE IRON AGE. Booth 5W 6a.

Represented by: F. J. Frank, president; C. S. Baur, general advertising manager; Emerson Findley, Central Western representative; B. L. Herman, western N. Y. State representative; Peirce Lewis, Detroit and Cincinnati representative; C. H. Ober, New York representative; W. B. Robinson, Pittsburgh representative; W. C. Sweetser, New Jersey representative; D. C. Warren, New England representative; F. S. Wayne, Western representative; C. E. La Chaussee, St. Louis representative; H. E. Leonard, O. Johnson and B. H. Hayes, assistants to general advertising manager; W. W. Macon, managing editor; F. L. Prentiss, Cleveland editor; R. A. Fiske, Chicago editor; R. E. Miller and B. Finney, editorial staff; A. H. Dix, manager reader service department.

J

Jones & Lamson Machine Co., Springfield, Vt. Booth 1A 10.

Hartness automatic dies and chasers, screw thread comparator, Hartometer; Flanders ground thread taps; chaser

grinder. Represented by: R. E. Flanders, manager; H. S. Bael, assistant general manager; E. T. Bysshe, chief engineer, die division; E. F. Lockwood, H. G. Taylor, H. A. Trimble.

Jones & Lamson Machine Co., Springfield, Vt. Booth 2C 6.
2¼ x 24 Hartness flat turret lathe for bar work; 3 x 36 Hartness flat turret lathe for chucking work; 14 in. standard Fay automatic lathe for second operation on clutch gear; 14 in. standard Fay automatic lathe for finning operation on airplane cylinders; 14 x 50 in. Fay automatic lathe with center drive tooled to machine large truck rear axle in one operation; 24 x 42 in. Fay automatic lathes for machining large flange shaft. Represented by: R. E. Flanders, manager; H. S. Beal, assistant general manager; J. E. Lovely, chief engineer, Fay department; W. F. Howard, F. W. Dodge, C. A. Erskine, B. L. Billings, A. L. Currie, H. C. Miller, F. A. Parker, G. J. Keller, F. L. Watkins, A. V. Wiggins, J. C. Price, C. H. Seaver, J. C. Hebert, J. L. Reilly.

K

Kane & Roach, Inc., Syracuse, N. Y. Booth 3W 14.
Literature and motion picture display of Kane & Roach equipment. Represented by: W. E. Kane, president; R. C. P. Kane, vice-president; H. W. Kane, secretary; H. Wier, engineer.

Kearney & Trecker Corporation, Milwaukee. Booth 2B 7.
No. 2 standard universal Milwaukee milling machine; No. 2 rotary vertical Milwaukee milling machine with skip-stock rotary table; No. 1402 Mil-waukee-Mill Simplex; No. 2207 bridge type Mil-waukee-Mill. Represented by: Theodore Trecker, president; E. J. Kearney, secretary and treasurer; George L. Erwin, Jr., sales manager; M. J. Scnmitt, assistant sales manager; C. M. Cheadle, Jr., advertising manager; C. R. Hochmuth, William K. Andrew.

Keller Mechanical Engineering Corporation, 70 Washington Street, Brooklyn. Booth 2C 3.
Type BL-2416 Keller full automatic tool room machine equipped with two-template rigging and attachment for locating and jig boring; No. R6 cutter and radius grinder; a Kellocater complete unit with over-arm and spindle equipped with power feed; Kellerflex flexible shaft machines including a 1 h.p. outfit. Represented by: J. F. Keller, president; Henry Schreiber, Charles Bitter, Paul Renno, W. L. MacRae, E. D. Ashley, Arthur Jenner.

Kelly Reamer Co., Cleveland, Ohio. Booth 5W 12-13.
Boring and reaming tools, including special production tools for boring and reaming and multiple cutting; turret lathe; drill press; horizontal boring mill; vertical turret lathe equipment for all types of work, particularly for cylinder crankcase and multiple cutting operations. Represented by: H. C. Putnam, president; E. W. Putnam, vice-president and general manager; D. E. Van Deusen, sales manager; A. H. Howard, sales engineer.

Kempsmith Mfg. Co., Milwaukee. Booth 1B 7.
Milling machines. Represented by: Robert J. Wilson, Frank Wollaeger, L. J. Radermacher, H. L. Livesay, Charles Watson, A. E. Nieman, Walter Mickelson, Hugo E. Czerwonky, R. F. Shaw.

Kent Machine Co., Cuyahoga Falls, Ohio. Booth 5A 1a.
Six spindle horizontal driller; double head countersinker; bar pointer; stud threader. Represented by: A. B. Babbitt, secretary and sales manager; A. F. Sinclair, factory manager.

Keystone Lubricating Co., Twenty-first and Clearfield Streets, Philadelphia. Booth 6A 2.
Keystone safety lubricators; Poneuma-Lectric lubricating system; grease cups; greases (solid, semi-solid cup greases, liquid greases for ring oil bearings). Represented by: H. A. Ruzby, president; George W. Hall, Peter Cassady, C. O. Norstrum, Philip King, H. M. Ludwick, Vic Berguson, R. C. McDaniels, G. W. Quinn, M. C. Schwenk.

King Machine Tool Co., Cincinnati. Booth 1A 2.
Heavy duty vertical boring and turning mills. Represented by E. A. Muller, C. F. Muller, I. Herbst, H. Glensman.

Kingsbury Machine Tool Corporation, Keene, N. H. Booth 2W 10.
Automatic multi-spindle indexing machine for drilling, reaming and tapping with pneumatic synchronization of spindle stroke and index, automatic two spindle vertical drilling and burring machine; automatic three spindle dial feed tapping machine; type AC opposed spindle drilling and tapping machine; model 30 drilling head; model 30 T. tapping head. Represented by: E. J. Kingsbury, president and treasurer; G. Swahnberg, chief engineer; J. E. Anderson, factory manager; H. B. Jones and G. G. Hathaway, sales engineers.

W. B. Knight Machinery Co., St. Louis. Booth 1W 10.
No. 4 and No. 2 Knight millers; set of dial indicators mounted on No. 4 miller for jig boring; high speed, horizontal, shaping, circular milling and index attachments for use on either No. 4 or 2 millers. Represented by: H. E. Knight, vice-president; Robert Smith.

L

William Laidlaw, Inc., Belmont, N. Y. Booth 5B 3.
Type CM 30 in. metal cutting band saw; type JM 20 in. metal cutting band saw; type SM 20 in. metal cutting band saw. Represented by: William Laidlaw, president; E. O. Jenkins, sales manager.

Landis Machine Co., Waynesboro, Pa. Booth 1B 8.
¾ in. Landis automatic forming and threading machine; 6 in. Landis pipe threading and cutting-off machine, motor driven, Lanco heads for automatic, semi-automatic and hand operated threading machines; Landmatic heads for turret lathes and hand operated screw machines; Victor collapsible taps for internal threading; Victor receding chaser collapsible taps for internal threading; Victor adjustable taps. Represented by: C. N. Kirkpatrick, sales manager; G. M. Stickell, assistant sales manager; R. G. Mumma, manager, Victor plant; S. W. Mathias, engineer; J. T. Benchoff, M. B. Henneberger, J. I. Davis.

Landis Tool Co., Waynesboro, Pa. Booth 1W 18.
Hydraulic cam grinder; hydraulic oscillating grinder; plain hydraulic grinder; hydraulic crank grinder. Represented by: R. F. Ingram, sales manager; Paul Stoner, sales engineer; F. W. Pensinger, advertising manager; A. P. Steiner, chief engineer; C. M. Talhem, F. M. Gertiser and William Ibsen.

La Salle Tool Co., Ottawa, Ill. Booth 3W 12.
No. 824 full electric automatic surface grinder; No. 3 electric surface grinder; No. 1 electric plain and surface grinder. Represented by: F. S. Knowles, president; John C. Kopf, general manager.

R. K. LeBlond Machine Tool Co., Cincinnati. Booth 2C 1.
No. 12 LeBlond heavy duty automatic lathe, texrope motor drive; No. 16 heavy duty automatic lathe; texrope motor drive; 11 in. x 4 ft. rapid production lathe with facing attachment, pan, pump, belted motor drive; 25 in. x 12 ft. heavy duty geared head engine lathe with geared motor drive; 15 in. x 8 ft. heavy duty geared head tool room with relieving attachment, draw-in attachment, taper attachment, pan, pump and texrope motor drive; 16 in. x 5 ft. rapid production lathe with plain rests, rapid power traverse, pan, pump, belted motor drive; No. 1 cutter grinder complete with all attachments, with power feed to table, and completely motor driven. Represented by: H. C. Pierle, sales manager; William F. Groene, vice-president; B. N. Brockman, William E. Groene, C. C. Carr, Dave Mills; William E. Strauss, works manager; W. L. Rybolt, advertising manager.

Lees-Bradner Co., Cleveland. Booth 3W 1.
Thread millers and gear cutters. Represented by: E. J. Lees, H. C. Young, T. E. Lord, R. A. Zilm, C. H. Eden.

Lehmann Machine Co., 3560 Chouteau Avenue, St. Louis. Booth 2W 24.
Geared head, motor driven engine lathe; gear lapping machine. Represented by: Paul Lehmann, A. H. Lehmann.

Leland-Gifford Co., Worcester, Mass. Booth 2B 1.
12 in. one spindle belt and motor spindle sensitive drill; 14 in. two spindle belt and motor spindle sensitive drill; 24 in. two spindle belted spindle drill. Represented by: S. B. Dowd, sales manager; H. P. Sawtell, D. H. Boothby, C. H. James, E. D. Baldwin, E. A. Heidlinger, T. A. Poutter, W. E. Fors, E. F. McCaffery.

Lincoln Electric Co., Coit Road and Kirby Avenue, Cleveland. Booth 5A 3.
Electronic tornado automatic welder in action; stable arc welder in action; Linc-Weld motors and welders supplies, samples, etc. Represented by: A. F. Davis, vice-president; R. P. Tarbell, O. P. Hanchette, F. W. Kessler, R. B. Tuhey, Morris R. Taylor, E. H. Bergstrom.

Link-Belt Co., Indianapolis. Booth 4C 1.
Link-Belt silent, roller and malleable chains and sprocket wheels; automatic idler for use with Link-Belt silent chain drives applied to main and integral shaft of machine tools; Link-Belt Paradox showing detailed action of silent chain on wheels; herringbone speed reducer in operation showing complete anti-friction reducer and full herringbone gears. Represented by: J. S. Watson, vice-president; R. S. Dyson, special engineer; E. H. Smedley, sales engineer; F. H. Dalrymple, R. Wainright, H. R. Cunning, L. Spillan.

Lodge & Shipley Machine Tool Co., Cincinnati. Booth 2B 11.
New 14-in. x 6-ft. Selective head tool room lathe and other lathes. Represented by: J. W. Carrel, H. J. Breitenbach, T. C. Stephens, W. L. Dollo, L. E. Eberts, H. M. Kordenbrock, J. E. Kordenbrock.

Logansport Machine Co., Logansport, Ind. Booth 1W 9.
Air operated work holding devices, including air operated chucks; chucking devices; rotating and non-rotating cylinders; arbor presses; milling and drilling vises; control valves. Represented by: F. B. Wilkinson, president; Frank G. Payson, general manager; J. C. Cotner, sales engineer; Andrew Michael, assistant superintendent.

Lucas Machine Tool Co., 523 East Ninety-ninth Street, Cleveland. Booth 1W 17.
No. 42 horizontal boring, drilling and milling machine; No. 41 horizontal boring, drilling and milling machine with dial indicator indexing device; 30-ton Lucas power forcing press. Represented by: H. M. Lucas, president; G. A. Yost, secretary; J. A. Leighton, sales manager; F. P. Sprague, R. L. Glaser, R. G. Goring, L. Reulbach.

Ludlum Steel Co., Watervleit, N. Y. Booth 6A 4.
Steel and tungsten carbide; mill and fabricated forms; Enduro Nirosto steel; Nitralloy; tool steels; forgings; Strauss metal. Represented by: H. G. Batcheller and F. B. Lounsberry, vice-presidents; A. F. Dohn, sales manager; C. B. Templeton, assistant to president; H. A. DeFries, metallurgist; W. Westover, advertising manager; H. I. Askew, J. C. Gearhardt, H. Hardwicke, G. Peterson.

M

Madison-Kipp Corporation, Madison, Wis. Booth 5W 11.
Fresh oil systems automatic centralized lubrication devices; automatic die casting machine films. Represented by: A. T. Lilligren, sales manager; J. A. Coleman, vice-president; J. A. Courter, eastern sales manager; T. E. Coleman, president; W. G. Coles, chief engineer; T. C. Korsmo, chief engineer of die casting division.

Manning, Maxwell & Moore, Inc., Putnam Machine Works, Fitchburg, Mass. Booth 2B 5.
Putnam 72-in. rotary continuous milling machine and 36-in. type K rotary slitting machine. Represented by: F. H. Walsh, E. L. Fickett, R. G. Holmes, J. H. Welch, W. A. Deems, F. P. Scott, O. B. Schmeltz.

Marschke Mfg. Co., Indianapolis, Ind. Booth 4B 1.
Universal portable electric tools; high cycle portable electric tools; Marschke grinders and Marschke swing frame grinders. Represented by: W. C. Allen, R. D. Black, R. E. Mizener, G. M. Buchanan, A. M. York, Lee H. Hind, Gus Fischer, Ralph Herrick, J. A. Fairfield, Luke Boyd, W. J. Fenwick, W. T. Johnston, Guy J. Coffey, C. C. Watts, W. S. Talbott.

McCrosky Tool Corporation, Meadville, Pa. Booth 5W 14.
McCrosky super-adjustable reamers and reaming bars; boring heads; Wizard quick-change chucks and collets; friction-drive tapping collets; safety tap holders; McCrosky turret tool posts for lathes; self-centering steady-rests; "Neva-Stop" face plates; tungsten-carbide turning tools. Represented by: F. P. Miller, president; R. W. Thomas, general manager; C. M. Sutton, sales manager; Frank Walster, shop superintendent; S. P. Miller, treasurer; Louis Skeel, engineer; W. J. Greenleaf, I. F. Belknap, A. J. Moore, Fred Fisher, I. C. Cameron, Arthur Fell, Frank Findlay.

Michigan Tool Co., 147 Joseph Campau Avenue, Detroit. Booth 5A 4.
Michigan Tool Co. milling cutters, hobs, gear shaper cutters, special tools; Colonial Tool Co. round, spline, and combination round-and-spline broaches; spline gages. Represented by: Otto Lundell, president and general manager; Michigan Tool Co.; O. L. Bard, secretary, Michigan Tool Co.; J. W. Mull, Jr., sales manager, Michigan Tool Co.; C. J. Halborg, general manager, Colonial Tool Co.; E. H. Kurtz, sales manager, Colonial Tool Co.

Modern Machine Tool Co., Jackson, Mich. Booth 5B 6.
Combination drill table and vise as applied to standard drill presses, electric drill presses and radial drills. Represented by: H. G. Walker, manager.

Moline Tool Co., Moline, Ill. Booth 2C 9.
No. 115-D hydraulic feed driller equipped with twelve standard BV type heads; No. 114-U driller equipped with 12 universal joint heads. Represented by: Wilson P. Hunt, C. R. Rosborough, Franklin Johnston, A. E. Lindberg, O. R. Reller, Willis C. Kuschmann, S. L. Brandenburg, R. H. Brandenburg, Louis Hallene, C. W. Hallene, C. E. Parkhurst, A. L. Sackett, Floyd Brown.

Monarch Machine Tool Co., Sidney, Ohio. Booth 2W 21.
16 in. x 6 ft. Monarch Model AA heavy-duty helical geared Timkenized high-speed lathe; 16 in. x 30 in. model C 16-speed helical geared completely Timkenized tool room lathe with full equipment; 24 in. x 10 ft. model N 16-speed extra heavy-duty helical geared Timkenized lathe; hydraulic automatic lathe. Represented by: W. E. Whipp, vice-president and general manager; F. C. Dull, secretary and assistant general manager; P. A. Abe, general superintendent; C. A. Bickel, chief engineer; C. L. Cameron, J. W. Dunn, Stanley Brandenburg.

Morse Chain Co., Ithaca, N. Y. Booth 5W 19a.
Morse silent chain drive; flexible couplings; speed reducer; device showing action of rocker joint; methods of lubrication. Represented by: A. B. Wray, sales manager; D. B. Perry, works manager; R. L. Phillips, R. J. Koch.

Morton Mfg. Co., Muskegon Heights, Mich. Booth 3W 19.
Morton 48 in. stroke high-duty draw-cut shaper with variable speed transmission; 18 in. stationary keyway cutter with direct connected reversing drive unit; Hi-pro keys; Robinson air hose couplings. Represented by: Henry E. Morton, president; G. F. Goble, mechanical engineer; F. Frank Bliss, H. Earl Morton, general superintendent; M. H. Morton, assistant to president.

Murchey Machine & Tool Co., 951 Porter Street, Detroit. Booth 2W 23.
Collapsible taps; self-opening die heads. Represented by: W. C. Beechner, sales manager; P. F. Zerkle, J. H. Coyle.

N

National Acme Co., Cleveland. Booth 1B 5.
4 in. Gridley automatic four spindle chucking machine; 1¼ in. Gridley automatic four spindle bar machine; 9/16 in. Acme automatic five spindle bar machine; centrifugal oil clarifying and separating machine; self-opening dies; collapsing taps. Represented by: A. E. Driessner, chief engineer; A. E. Henn, manager, machinery sales department; H. F. Fussner, manager, die and tap sales department; A. O. Bredemere, W. A. Johnson, R. J. Preston, W. G. Furlong, E. C. Lange.

National Automatic Tool Co., Richmond, Ind. Booth 1D 1.
Multiple spindle way driller; multiple spindle way tapper; vertical hydraulic single spindle heavy-duty driller; vertical hydraulic multiple adjustable spindle driller; vertical single spindle Hi-duty gear feed driller; small multiple spindle driller; universal joints. Represented by: H. W. Bockhoff, president; H. C. Hunt, secretary; E. D. Frank, sales manager; E. A. Herrcke, assistant sales manager; R. M. Galloway, chief engineer; M. L. Strawn, C. G. Dvorak, G. E. Moote, W. F. Hart, C. H. Briggs, G. W. Schepman, T. C. McDonald, E. H. Flook.

National Machinery Co., Tiffin, Ohio. Booth 1A 8.
National 1½ in. high-duty heading and forging machine; ⅜ in. automatic nut tapper; ⅜ in. automatic nut tapper.

National Twist Drill & Tool Co., Detroit. Booth 4B 5.
Interlocking slab milling cutters, heavy-duty parabolic type; staggered tooth side milling cutters; inserted blade high-duty face milling cutters; twist drills; reamers; milling cutters; hobs; special tools; taps; dies; screw plates. Represented by: Harry Butler, assistant manager of sales; George Ringstad, advertising manager; C. J. Oxford, chief engineer; W. R. Crook, H. C. Toomey, C. Cornwall, H. W. Springer, H. L. McGregor, president; C. E. Smith, vice-president and sales manager.

New Britain-Gridley Machine Co., New Britain, Conn. Booths 2A 3 and 2W 26.
No. 38 New Britain single-spindle, hydraulically operated work rotating chucking machines. Represented by: H. H. Pease, president; Edward L. Steinle, vice-president and sales manager; George O. Gridley, E. H. Wheeler and D. H. Montgomery, vice-presidents; R. S. Brown, secretary; Frank Rau; T. C. Stirling, G. K. Atkinson, L. E. Jolls, James W. Barr.

New Departure Mfg. Co., Bristol, Conn. Booth 5W 5.
New Departure bearing equipped spindle for vertical multiple spindle automatic; ball bearing equipped spindle and cylinder for large six spindle automatic; ball bearing equipped small high-speed internal grinder spindle; bearing equipped tailstock live centers of various sizes; various types of ball bearings used in machine tools. Represented by: F. G. Hughes, vice-president; T. C. D. Crow, chief engineer; J. H. Beninger, assistant chief engineer; F. W. Marschner, G. W. Fowler, L. H. Gaylord.

Niagara Machine & Tool Works, Buffalo. Booth 3W 20.
Niagara No. 68-B double crank power press, geared, four piece tie rod frame; No. 56 straight side single crank press, geared, four piece tie rod frame; No. 696 power gap squaring shear; No. 4½ inclinable power press, plain, flywheel type; new type No. 340 slip roll former; No. 172 electric combination machine with interchangeable rolls for beading, crimping, turning, wiring, burring, edging and slitting. Represented by: Russell J. Caplin, Dolph F. Lindgren.

Niles Tool Works Co., Hamilton, Ohio. Booth 2D 1.
36 in. and 44 in. side-head boring mill; Time Saver lathe; 62 in. boring and turning mill. Represented by: G. A. Rentschler, O. S. Ackley, L. C. Cole, A. C. Wais, A. T. Kuehner, J. E. Peterson, G. R. Shields, Harry Evans, Walter Brown, Carl Stomps.

Noble & Westbrook Mfg. Co., East Hartford, Conn. Booth 5W 3.

Power and hand operated marking machine for general purposes; rapid production single purpose marking machines; steel marking dies; steel stamps; automatic numbering heads for marking on metal. Represented by R. H. Noble, works manager; H. B. Knoble, superintendent, F. Berthold Helander, sales engineer; George Westbrook, president.

Norma-Hoffmann Bearings Corporation, Stamford, Conn. Booth 4W 4.

Ball, roller and thrust bearings; machine tools of the smaller sizes with sectioned bearing mountings; photographs of machine tool applications; Norma minimeter (a precision measuring instrument); Hoffmann bearing pedestals. Represented by: O. P. Wilson, vice-president; G. R. Bott, engineering manager; D. E. Batesole, assistant engineering manager; Harry L. Day, factory superintendent; C. A. Baden, plant engineer; H. J. Ritter, assistant secretary; R. E. Hecker, Cleveland district manager; C. D. Kilham, sales engineer; T. J. Harley, Chicago district manager.

Norton Company, Worcester, Mass. Booth 2A 10.

Crankpin grinding machine, hydraulic drive; crankshaft bearing grinding machine, hydraulic drive; plain cylindrical grinding machine, hydraulic drive, 10 x 48-in. size; open side surface grinding machine, hydraulic drive, 6 x 10 x 48-in. size; type A cylindrical grinding machine equipped with hydraulic wheel slide movement; type No. 50 crankshaft lapping machine; type No. 15-C cylindrical lapping machine. Represented by: W. L. C. Neilson, vice-president and general sales manager; G. N. Jeppson, vice-president in charge of manufacture; H. W. Dunbar, works manager; C. H. Norton, consulting engineer; A. G. Belden, chief engineer; S. Player, R. A. Cole, W. T. Montague, H. J. Griffing, H. P. Chace, H. Wickstrom, H. N. Harding, A. R. Sandine, John Cook, C. H. Hill, O. A. Knight, M. E. Mattson, G. C. Montague, O. E. Nordstrom, F. W. Smith, C. W. Atwood, H. S. Bowler, W. D. Briggs, H. O. Hedlund, E. W. Hellstrom, H. L. Swainey, G. B. Taft, G. E. Hulbert.

O

Oakite Products, Inc., 22 Thames Street, New York. Booth 4W 1.

Literature and data pertaining to the cleaning of metals, cutting, grinding, rust prevention and stripping finishes, and describing cleaning in industry generally. Represented by: H. L. Gray, A. W. Perry, L. B. Johnson.

Osterlein Machine Co., Cincinnati. Booth 1A 13.

No. 36 Milomatic (an automatic hydraulic reciprocating and indexing bed type milling machine); 28-in. tilted offset miller; 48-in. tilted offset miller; No. 2 Universal standard miller; No. 2 grinder. Represented by: C. D. Oesterlein, Charles Freudenthaler, A. H. Merschel, David F. Noble, G. A. Richey, Carl Kline.

Ohio Machine Tool Co., Kenton, Ohio. Booth 2D 8.

36-in. Super-Dreadnaught shaper; 24-in. shaper; Swift No. 35 flue welder; No. 6 combination copper and steel welder; No. 12 automatic welder; No. 16 projection welder. Represented by: Charles C. Swift, Cecil J. Davis, F. E. Taylor, H. A. Woofter.

Oilgear Company, 647 Park Street, Milwaukee. Booth 2A 5.

Oilgear 25-ton Gooseneck type straightening press; Twin-12 horizontal broaching machine; automatic variable delivery machine tool feed equipment. Represented by: H. M. Swigart, president; W. D. Creider, general manager; G. H. Fobian, sales manager; J. P. Ferris, chief engineer; Ernst Weidman, mechanical engineer; E. C. Wollaeger, Donald Clute, W. G. Prasse, E. H. H. Graf, M. E. Engebretson, Frank Kuhagen, A. Hoffman, J. O'Rourke, L. M. Gross.

O. K. Tool Co., Inc., Shelton, Conn. Booth 4B 7.

O. K. metal cutting tools, lathe planer, boring mill and boring tools and holders; including inserted blade milling cutters; boring and facing heads, hollow mills and multiple operation tools. Represented by: R. R. Weddell, chief engineer; F. S. Schroeder, J. W. Costello, L. F. King.

Oliver Instrument Co., Adrian, Mich. Booth 1W 6.

No. 51 Oliver drill grinder; Arc face mill grinder No. 2; drill point thinner; tap grinder; No. 21 drill grinder; 8-4 die making machine; heavy duty die making machine. Represented by: E. C. Oliver, Robert J. Sack.

Oster Mfg. Co., 2057 East Sixty-first Place, Cleveland. Booth 3W 17.

Pipe and bolt threading and cutting-off tools and machines. Represented by: A. S. Gould, secretary; R. E. Hyde, chief engineer; R. E. Willis, R. J. Oster.

P

Peerless Machine Co., Racine, Wis. Booth 1A 11.

Metal sawing machines of 6 x 6 in. and 9 x 9 in. capacity. Peerless universal type; metal sawing machines of 14 x 16-in. capacity for heavy-duty work, and billets and large diameters of metal; Chicago No. 2 power pipe threading machine ⅛-in. to 2-in. capacity; universal No. 2 portable pipe cutting and threading machine of ¼-in. to 2-in. capacity. Represented by: Charles Rasmussen, president; I. M. Ward, vice-president; R. T. Ingalls, secretary-treasurer; O. M. Jensen, superintendent; A. H. Goetz, sales manager.

Porter-Cable Machine Co., Syracuse, N. Y. Booth 1W 19.

Manufacturing lathe; universal milling machine attachments; portable electric hand belt grinders; portable electric hand saws; two-way belt grinder; flexible belt grinder; spindle sander; disk grinders and sanders; horizontal disk grinder. Represented by: D. J. Ridings, sales manager; A. N. Emmons, chief engineer; E. A. Herrig, F. P. Morrow, G. H. Potts.

Potter & Johnston Machine Co., Pawtucket, R. I. Booth 3W 6.

Automatic chucking machines; automatic chucking or turning machine. Represented by Norman R. Earle, manager of sales.

Pratt & Whitney Co., Hartford, Conn. Booth 2D 1.

13 x 30-in. model B lathe with full relieving attachments; 16 x 36-in. model B lathe; 20 x 48-in. model B lathe; bench machine tool equipment including a P & W bench lathe, No. 3 Universal bench miller, No. 0 Sigourney drill; 14-in. vertical surface grinder; 6-in. vertical shaper, model B; 12-in. vertical shaper, model B; No. 1A and 3A jig borers with regular equipment and full attachments, including indexing table; No. 2 vertical automatic; six-spindle vertical deep-hole driller; complete line of gages; small tools; taps, dies, reamers, milling cutters, punches, etc. Represented by: C. R. Burt, vice-president and general manager; W. P. Kirk, general sales manager; Charles M. Pon, manager small tool and gage divisions; David Ayr, manager machinery division; Frank Hoagland, master mechanic; A. H. d'Arcambal, sales manager small tools and gages; E. C. Shultz, advertising manager; William Law, Harold Welch, M. S. Bradley, William Hunter, P. C. McBeth, H. William Kopf, R. W. Henke, J. D. Allan, Frank Schreiner, D. S. Woods, B. A. Donahue, L. A. Quinn, D. D. Brumbaugh.

Producto Machine Co., Bridgeport, Conn. Booth 1W 14.

No. 50 Producto-Matic milling machine equipped with a four-station flat turret type of work holding fixture; No. 12 automatic single-spindle cam milling machine. Represented by: N. M. Marsilius, president; E. A. Harper and A. J. Cummings, vice-presidents; M. E. Gombar, engineer.

Thomas Prosser & Son, 15 Gold Street, New York. Booth 4C 6.

Widia tungsten carbide lathe tools; planer tools; shaper tools; drills; reamers; milling cutters; boring tools; special tools. Represented by: R. D. Prosser, general manager; W. E. Guild, sales manager; E. R. S. Reeder, J. A. Deakin.

Q

Q-C Engineering & Tool Sales, Inc., 7 East Grand Avenue, Detroit. Booth 4A 6.

Airflex riveting hammers; Roto live centers; Q-C drill bushings and locating pins; quick-clamp standardized fixture units. Represented by: A. H. Pearson, president; A. M. Sargent, assistant general manager; R. E. Bloye, R. W. Burgess, G. D. Scott.

R

Racine Tool & Machine Co., Racine, Wis. Booth 2W 20.

10 x 10-in. Racine shear cut production saw; 6 x 6-in. shear cut production saw, screw feed; 6 x 6-in. gravity feed high-speed saw; 4 x 4-in. junior saw; duplex band saw. Represented by: M. E. Erskine, president; E. R. Larson, J. S. Toohey, William Reinhardt, P. F. Schatzman, S. P. Schafer, P. O. Ott, R. Fuller.

Ramsey Chain Co., Albany, N. Y. Booth 4W 3.

A tachometer exhibit showing lack of friction in chain; panel exhibit showing three Ramsey silent chains operating on small sprockets. Represented by: D. I. Wheeler, sales manager; H. N. Davis, manager Cleveland branch; Daniel Kessler, manager Chicago branch; F. H. Trombley, sales engineer Cleveland branch.

Reed-Prentice Corporation, Worcester, Mass. Booth 2W 2-3.

No. 3 Reed-Prentice new model high-speed ball bearing vertical milling and die sinking machine; 16-in. new model Reed-Prentice sliding geared head lathe; No. 5 Reed-Prentice new model vertical milling and jig boring machine. Represented by: R. C. Blackinton, chief engineer; F. W. McIntyre, vice-president; D. C. Forsman, A. W. Schneider, works manager; G. W. McIntyre, J. A. Benson.

Reliance Electric & Engineering Co., 1088 Ivanhoe Road, Cleveland. Booth 6A 6.

Reliance type T heavy-duty d. c. motors and fully enclosed

fan-cooled motors. Represented by: R. O. Herbig, R. A. McDowell, J. W. Corey, C. L. Peterson, H. H. Howard.

Rickert-Shafer Co., Erie, Pa. Booth 2C 10.
Automatic single purpose threading machines; self-opening die heads; collapsible taps; automatic and semi-automatic tapping machines; chaser grinders; boring heads; chasers. Represented by: George E. Shafer, president; August A. Rickert, treasurer; Arthur A. Shafer, secretary; C. W. Howard, sales manager and representative; J. W. Shea, service manager and assistant representative.

Rivett Lathe & Grinder Corporation, Brighton, Boston, Mass. Booth 5B 5.
Blanchard pulsating system for automatic oil lubrication for machinery; Forkup, Forkans, Forkguns for controlled oil lubrication, pressure grease appliances and systems. Represented by: Frederick C. Blanchard, chief engineer; Thorvald S. Ross, president.

Rockford Drilling Machine Co., Rockford, Ill. Booth 2W 25.
Rockford Two-Way production boring machine; Pullmore industrial clutches. Represented by: E. C. Traner, W. W. Blomberg, J. L. Peterson.

Rockford Machine Tool Co., Rockford, Ill. Booth 2B 3.
Rockford shaper-planer, 42-in. hydraulic driven; 24-in. Rockford Hy-service shaper. Represented by: Morris Monson, production manager; H. B. Newton, vice-president and general manager; R. C. Lind, president; A. B. Leet, chief engineer; J. G. Anderson, superintendent.

Ross Mfg. Co., Cleveland. Booth 4W 9.
Mechanical emery wheel dressing and truing tools; machine cooling fluid pumps. Represented by: M. L. Climo, W. C. Weslow, H. Joslin, D. Kelleher, H. P. Meyer, F. A. Centner.

Rotor Air Tool Co., 5704 Carnegie Avenue, Cleveland. Booth 5B 8.
Portable air drills, grinders, sanders and buffers. Represented by: H. P. Bailey, president; K. L. Pohlman, vice-president; R. J. Cook, factory representative; W. G. Baily, Cleveland district manager; F. B. Engeln, sales department.

Joseph T. Ryerson & Son, Inc., Sixteenth and Rockwell Streets, Chicago, Booth 2D 2.
No. 3, 4 and 7 Ryerson combination shear punch and coper for punching, shearing, coping and notching structural shapes, plates, bars, etc.; 300-ampere Wilson arc welder in operation in a glass booth; No. 2 Ryerson serpentine shear for cutting irregular shapes from sheet steel; Ryerson flue cutter and polisher and Ryerson flue roller; Ryerson No. 0 high-speed friction saw for cutting light metal shapes, moldings, etc.; Ryerson No. 0 high-speed friction saw with rotating attachment for cutting tubes, bars, etc. Represented by: A. G. Bryant, manager; A. P. Schumann, assistant sales manager; R. S. Armstrong, assistant sales manager; I. B. Yates, V. N. Towers, Chicago; H. J. Aagaard, J. M. Lewis, F. J. Clark, F. G. Grosse, R. C. Page, D. MacArthur, J. C. Buckels, W. R. Sprague, T. W. Delanty, I. J. Vyduna, H. D. Broxon, E. J. Burki, E. N. Carlson, A. L. G. Gentles, G. H. Merriell, H. L. Robinson, O. A. Bloomquist, J. A. Egbert, J. M. Eckes, S. J. Johnson, M. C. Fidgeon, A. L. Nacke, R. H. Happersett, E. A. Lynch, H. M. Shaw, D. B. Parker, D. S. Mair, C. J. Harter, P. H. Petersen.

S

Safety Grinding Wheel & Machine Co., Springfield, Ohio. Booth 2B 10.
Heavy portable grinder, Rite Speed floor grinders, grinding wheels for every purpose. Represented by: Charles W. Gwyn, president and manager; H. G. Weinland, secretary; H. G. Bennett, W. H. Vance, C. A. Wampfler, R. S. Dilliard.

Sebastian Lathe Co., Covington, Ky. Booth 1W 24.
20-in. semi-automatic production lathe; 15-in. motor-driven lathes; 11-in. motor-driven lathe; 11-in. high-speed production lathe. Represented by: E. E. Stokes, president; C. R. Cooper, purchasing agent; William Schroeder, superintendent; Ray Rece.

Wm. Sellers & Co., Inc., Philadelphia. Booth 2A 6.
No. 2A drill grinder, capacity 5/16 in. to 3 in. in diameter; drill point thinning machine, capacity ½ in. to 3 in.; No. 1A tool grinding and shaping machine, capacity up to 3 x 3 in.; No. 2 tool grinding and shaping machine, capacity up to 1½ x 2 in.; No. 1 hob and cutter grinder for sharpening straight and spiral gashed hobs up to 12 in. long 12 in. diameter, reamers, taps, spiral milling cutters, etc. Represented by Alexander Sellers, George H. Benzon, John D. McClintic, E. L. Hollijes, Coleman Sellers, 3rd, J. C. Hinton, William Sellers, D. F. Robinson, A. Sellers, Jr.

Seneca Falls Machine Co., Seneca Falls, N. Y. Booth 1A 9.
Seneca Falls turning equipment; Lo-Swing lathes; semi-automatic lathe; full automatic lathes; Short-Cut production lathes. Represented by: E. R. Smith, vice-president and general manager; J. A. Fyfe, secretary; P. Branigan, A. Schinkez, F. E. Joel, F. C. Herbert, F. B. Webb, M. C. Day, W. H. Nettle, G. E. Fogarty.

Sidney Machine Tool Co., Sidney, Ohio. Booth 2W 6.
22-in. x 12-ft. Monotrol engine lathe; 16-in. x 6-ft. Monotrol toolroom lathe; 18-in. x 8-ft. Tritrol lathe; open Monotrol geared headstock. Represented by: A. C. Getz, general manager; B. A. Getz, sales manager; F. H. Dickas, chief engineer; A. L. Jennings, superintendent; L. S. Kirdy, W. A. McClure.

Siewek Tool & Die Co., 10233 Woodward Avenue, Detroit. Booth 6A 3.
Represented by O. H. Siewek.

Simonds Saw & Steel Co., Fitchburg, Mass. Booth 4B 4.
Circular and band saws for cutting metal; files; Red Streak hack saws; abrasive grinding wheels. Represented by: George T. Curtis, Harry P. Baumann.

S K F Industries, Inc., 40 East Thirty-fourth Street, New York. Booth 4W 12.
Ball and roller bearings for machine tools. Represented by: P. T. Hopper, W. F. Temple, R. Smith, P. R. Payson, F. E. Ericson, R. H. DeMott, W. Jetter, R. R. Zisette.

Skinner Chuck Co., New Britain, Conn. Booth 4W 13.
Lathe chucks of various sizes and weights; face plate jaws, drill press vises; milling machine vises; drill chuck; air chucks. Represented by: A. E. Thornton, assistant treasurer; D. M. Stevenson.

Sleeper & Hartley, Inc., Worcester, Mass. Booth 5A 1.
No. 2 Universal spring coiling machine with wire reel. Represented by W. H. Blount.

Smith & Mills Co., Cincinnati, Ohio. Booth 2W 19.
One 25-in. back-geared heavy-duty crank shaper constant speed motor drive complete with 7½-hp. motor; One 12-in. single-geared crank shaper constant speed motor drive complete with 2-hp. motor. Represented by: J. E. Mills, president, and W. J. Struewing, superintendent.

Springfield Machine Tool Co., Springfield, Ohio. Booth 1W 7.
14-in. x 6-ft. quick-change geared-head engine lathe; belted motor drive in leg, with taper attachment, Timken bearings, draw-in collet attachment with collets; 18-in. x 8-ft. quick-change geared-head engine lathe, belted motor drive in leg, taper attachment, oil pan, Timken bearings and turret tool post; machine for removing gear teeth from flywheels. Represented by: Edward S. Montanus, secretary, and Paul A. Montanus, vice-president.

Standard Electrical Tool Co., 1938 West Eighth Street, Cincinnati, Ohio. Booth 4C 4.
Portable electric drills; electric-driven grinders; electric-driven buffers; electric-driven polishing machines. Represented by G. H. Feltes, president.

Standard Steel Specialty Co., Beaver Falls, Pa. Booth 5C 5.
Machine keys; Woodruff keys; machine rack; taper pins; elevator guides; special milled sections. Represented by: E. J. Wagner, president, and J. B. Jamison, secretary and sales manager.

Standard Tool Co., 6918 Central Avenue, Cleveland. Booth 5W 2.
Twist drills; reamers; taps; milling cutters; drill chucks. Represented by: H. C. McKean, general manager; W. P. Ross, manager of sales; R. R. Higgins, assistant sales manager; H. R. Hanson, C. C. Buck, T. D. Bascom and J. G. Green.

Stark Tool Co., Waltham, Mass. Booth 1W 23.
Stark Precision lathes; bench milling machine; motor drive unit. Represented by: Frederick T. Potter, factory manager, and E. Clifford Potter, president.

L. S. Starrett Co., Athol, Mass. Booth 5W 8.
Mechanical tools; gages; micrometers; indicators; rules, squares; hack saws; steel tapes. Represented by: H. E. Masters, W. D. Starrett, J. G. Sisson, D. Findlay, sales manager A. H. Starrett and O. J. Rogers.

Stockbridge Machine Co., Abbott Street, P. O. Box 44, Worcester, Mass. Booth 1W 13.
Barrett centrifugal oil extractor, model 1200; centrifugal dryer, model 502; centrifugal washer, model 251; Stockbridge heavy-duty back-geared shaper with patented two-piece crank. Represented by: Leon J. Barrett, R. A. Johnson, H. G. Kilbourne, C. B. Laing and N. F. Holter.

D. A. Stuart Oil Co., 2733 South Troy Street, Chicago. Booth 4W 5.
Stuart's Thread-Kut alloy steel cutting oil; Super-Kool light-colored heavy sulphur base oil; Codol liquid grinding compound; Kleen-Kut soluble oil; Drawsol deep drawing compound; No. 34 soluble quenching oil. Represented by: T. B. Langdon, W. H. Oldacre, C. H. Baker, G. A. Dudley, J. W. Beaver, C. I. Grierson and A. S. Hull.

Sunstrand Machine Tool Co., Rockford, Ill. Booth 1A 7.
No. 40 Rigidmil; No. 33 Rigidmil; No. 22 Rigidmil; No. 3 Rigidmil; 8-in. brake drum lathe; 15-in. automatic stub lathe; 4 x 24-in. centering machine. Represented by: Hugo

L. Olson, president and general manager; G. D. Sundstrand, chief engineer; D. B. Burleigh, general sales manager; L. A. Dunser, assistant chief engineer; Gust H. Ekstrom, works manager; G. A. Markuson, T. B. Buell and A. E. Gutzwiller.

Sun Oil Co., Philadelphia. Booth 4A 4.
Emulsifying and straight cutting oils; machines demonstrating cutting oils; machined parts. Represented by: R. S. Drysdale, C. K. Hague and C. B. Harding.

Superior Machine Tool Co., Kokomo, Ind. Booth 3W 18.
Superior type M-10-in. bench drill, motor-driven; type B-20-in. floor drill, motor-driven; type HD-25-in. floor drill, motor-driven. Represented by: E. A. Simmons, president; C. E. Hansell, secretary; O. L. Ham and M. L. Hensley.

Swift Welder Co., Kenton, Ohio. Booth 2D 8.
36-in. Super-Dreadnaught shaper; 24-in. dreadnaught shaper; Swift No. 35 flue welder; No. 6 combination copper and steel welder; No. 12 automatic welder; No. 16 projection welder. Represented by: Charles C. Swift, Cecil J. Davis, F. E. Taylor and H. A. Woofter.

T

Taft-Peirce Mfg. Co., Woonsocket, R. I. Booth 3W 11.
Adjustable reamers; angle irons; box parallels; boring tool holders; contract service; plug, ring, snap and thread gages; parallels; production and inspection tools; sine bars; Superpower magnetic chucks; surface plates; thread milling machine; toolmakers' knees; V blocks. Represented by: F. S. Blackall, Jr., P. V. Miller, W. E. Rogers and E. D. Wolf.

Taylor & Fenn Co., Hartford, Conn. Booth 2A 3a.
Two-spindle horizontal spline milling machine; high-speed vertical milling machine; two-spindle drilling machine with built-in motors on the head; four-spindle drilling machine; No. 0 spring press; No. 00 spring press; No. 12 motor-driven spring press. Represented by: George S. DeLany and Nels Carlson.

Thompson Grinder Co., Springfield, Ohio. Booth 2W 13.
Thompson 12 x 36-in. self-contained motor-driven Universal grinding machine. Represented by: C. Baldenhofer, president and general manager; H. J. Warrick, vice-president and secretary; W. G. Baldenhofer and J. A. Martin.

Timken Roller Bearing Co., Canton, Ohio. Booth 4W 2.
Timken tapered roller bearings. Represented by: L. M. Klinedinst, W. B. Moore, R. P. Kelley, J. W. Weir, G. D. Thewlis and S. M. Weckstein.

Titeflex Metal Hose Co., 500 Frelinghuysen Avenue, Newark, N. J. Booth 5B 7.
Titeflex all-metal flexible tubing, for the carrying of lubricants and cutting compounds. Represented by: Elbert E. Husted, sales manager, and R. R. Hazel.

Torrington Co., Torrington, Conn. Booth 1W 1.
Three sizes of Dayton-Torrington swaging machines; Torrington ball bearings. Represented by: F. T. Case, G. H. Schneider and M. W. Maine.

Tuthill Pump Co., 131 West Sixty-third Street, Chicago. Booth 5C 3.
No. 1R reversing pump for handling coolant; No. 6M motor-driven pump for handling coolant; No. 2M motor-driven pump for handling coolant; OB motor-driven pump for lubricating or hydraulic service; No. 6C tight and loose pulley drive pump for handling quenching oil; No. 2MS pump unmounted; No. 2CS pump unmounted; Tuthill high-pressure pump for hydraulic service, unmounted. Represented by: G. B. Tuthill, H. E. Kempton, W. C. Croft and H. C. Osborne.

Twin Disc Clutch Co., Racine, Wis. Booth 4W 15.
Dry plate type clutches; multiple disc clutches designed to operate in bath of oil. Represented by: P. H. Balten, president; W. C. Gewalt, vice-president; G. M. Guilbert, secretary and sales manager; R. H. Smith, W. L. Dixon, G. L. Williams.

U

Union Mfg. Co., New Britain, Conn. Booth 5C 8.
Lathe chucks; boring mill chucks; planer chucks; drill chucks; face plate jaws; boring mill jaws; chain hoists. Represented by: C. S. Neumann, president; F. J. Wachter, vice-president and sales manager; A. E. Church, E. I. Stevens, J. A. Smith, president; H. O. Coe, J. C. Goodman, R. H. Clore, F. Franklin, W. B. DaSilva, R. N. Brayer, H. B. Griner, H. N. Kelsey and J. R. Miller.

United States Electrical Tool Co., 2488 West Sixth Street, Cincinnati. Booth 1A 15.
Electric direct-connected grinders and buffers; electric lathe grinders; portable grinders; electric drills. Represented by: G. M. Lawrence, sales manager; G. E. Smith, treasurer;

Universal Boring Machine Co., Hudson, Mass. Booth 2B 4.
No. 40 Triway Universal horizontal boring machine; Hanson measuring attachment. Represented by: John C. Spence, works manager; Leon F. Marsh, Warren B. Robbins and Walter H. Chapman.

V

Van Dorn Electric Tool Co., 3000 Woodhill Road, Cleveland. Booth 4B 3.
Portable electric drills; screw drivers; tappers; nut setters; reamers; portable and stationary polishers; grinders; buffers; drilling and grinding stands, bench type; portable electric hammers; portable automatic heat control glue heaters; electric valve refacers; valve reseating cutters; portable disc sanders; portable electric socket wrench; high frequency portable high production tools. Represented by: F. Schneider, president; F. H. Zulauf, vice-president and general manager; R. W. Proctor, sales manager; E. W. Waechter, assistant sales manager; E. L. Connell, chief engineer; S. S. Waters, L. L. Charnicky, F. R. DuGuay.

Van Norman Machine Tool Co., 150 Wilbraham Avenue, Springfield, Mass. Booth 1A 14.
No. 10 Van Norman Duplex miller, motor-driven, with worm index centers and high-speed spindle; No. 3 Duplex miller, motor-driven, with 10-in. full Universal centers, sub-head, and Universal slotting attachment; No. 25 oscillating grinder, motor-driven, with full ball bearing work heads, special chucking device and water equipment. Represented by: C. E. Van Norman, president; F. D. Van Norman, vice-president; J. Y. Scott, general sales manager; L. H. Campbell, vice-president; William M. Edes, Roger Pyne, H. Bordeaux.

W

O. S. Walker Co., Inc., Worcester, Mass. Booth 2W 8a.
Single-stroke surface grinding machine; magnetic chucks. Represented by: George F. Shirley, Elzear Laporte, Clayton O. Smith, Howard E. Tracy.

Warner & Swasey Co., Cleveland. Booth 1A 1.
No. 5-A and 1-A Universal hollow hexagon turret lathes in operation on actual work; No. 5 and No. 4 Universal all geared-head turret lathes in operation on actual work. Represented by: P. E. Bliss, president; A. C. Cook, vice-president; C. J. Stilwell, vice-president and general sales manager; E. R. Gardner, H. R. Ward, L. K. Berry, A. H. Keetch, W. K. Bailey, W. L. Loegler, C. S. Stilwell, G. Kochenderfer, F. J. Pelich, L. M. Cole, L. R. Hawkins.

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. Booth 5B 1.
Motor starters; motors; gears; belt drive (cog belt); controllers for motors; electric welders. Represented by: Bernard Lester, C. B. Stainback, H. L. Wilson, P. McShane, W. W. Reddie, J. M. Wetzig.

Whitney Mfg. Co., 237 Hamilton Street, Hartford, Conn. Booth 2B 6.
Chains and sprockets for power transmission. Represented by: R. A. Glass, R. A. Follensby and S. C. Smith.

Whitney Metal Tool Co., Rockford, Ill. Booth 2W 16.
Ball bearing metal punches; lever type metal punches; deep throat metal punches; angle iron machinery; notcher; benders; shears; awls; hammers; rivet sets. Represented by: John Jensen, secretary and manager, and August Jensen.

Williams Tool Corporation, Erie, Pa. Booth 3W 3.
6-in. Williams Rapiduction pipe threading machine; 2-in. double spindle bolt threader; 2-in. portable pipe threading machine; 4-in. Wilco pipe threading machine. Represented by: E. P. Poole, vice-president; D. Moreinis, C. Tankred and H. VanOsten.

Wisconsin Electric Co., Racine, Wis. Booth 5C 4.
No. 5 grinder with attachments A, B and C; No. 3 grinder, tool shop utility tool; No. 2-AG grinder drills; No. 1 grinder motors. Represented by: C. A. Pope, W. B. O'Neill, W. E. Pomeroy.

Y

Yale & Towne Mfg. Co., Stamford, Conn. Booth 4C 5.
Yale chain blocks, trolleys, cranes, electric hoists, motor-driven trolleys, electrical industrial trucks, hardware, locks. Represented by: J. C. Morgan, E. H. Fairchild, H. S. Pierson, R. H. Irwin, F. A. Dewey, M. G. Peck, R. L. Higgins, C. O. Hedner.

Machinery Markets and News of the Works

Tool Demand Drops Slightly

Sales of Heavy Machines, However, Have Been Considerably Better Than in August

ALTHOUGH a decrease in machine tool sales is reported from some centers, business the past week was in fairly substantial volume. Many buyers are refraining from making further major purchases until after the National Machine Tool Exposition in Cleveland, but this tendency is not pronounced in the demand for planers, boring mills and other heavy tools, orders for which have been considerably better than in August.

The General Electric Co. has not yet closed for a number of lathes for its Schenectady, N. Y., works and has postponed placing orders for its Lynn, Mass., plant until next month. The Westinghouse Electric & Mfg. Co. is continuing to order tools for its electric refrigerating manufacturing division at Springfield, Mass., and Pullman Co. is expected to close soon for 18 motor-driven tools for delivery to Buffalo. The United States Aluminum Co., New Kensington, Pa., has begun contracting for equipment for its new machine shop. Union Drydocks, Inc., Port Richmond, N. Y., is inquiring for a list of tools.

The Amtorg Trading Corporation, which was reported a week ago as having closed for a large number of lathes, is negotiating for further equipment, including turret lathes, punches and shears, for shipment to Soviet Russia.

Despite a falling off in fresh bookings this month, unfilled orders of machine tool builders are sufficient to insure production at full capacity during the remainder of the year and in some cases well into 1930.

The National Machine Tool Builders' Association states that the volume of orders booked by members during August recovered considerably from the July recession and was 23 per cent greater than in August, 1928. The association's index shows the three months' average of gross orders at 286.1 for August, a 30 per cent gain over the same month of last year. Unfilled orders at 692.5 were approximately the same as in July. Machine tool plants, declares the association, have been operating overtime to catch up on unfilled orders, still two and a half times current shipments.

New York

NEW YORK, Sept. 17.—Inquiry for machine tools is considerably smaller than in August, but this is attributed by sellers to the desire of buyers to wait until after the National Machine Tool Exposition in Cleveland. Meanwhile, the Amtorg Trading Corporation, New York, which has closed on engine lathes and automatic screw machines for export to Russia, is still negotiating for a list of tools, including turret lathes and punches and shears. The General Electric Co. has not yet closed on lathes for Schenectady, and has postponed purchases for Lynn, Mass., until next month. Recent buying by this company has been for divisions other than the refrigerator manufacturing plant. The Westinghouse Electric & Mfg. Co., however, continues to buy tools for its refrigerator plant at Springfield, Mass., and last week closed for equipment including five engine lathes. Union Drydocks, Inc., Port Richmond, Staten Island, N. Y., is in the market for a number of machine tools and has bought some used equipment. Builders are fully engaged, and deliveries on most tools range from early December to late January or early February.

Murcott & Campbell, 298 Union Avenue, Brooklyn, manufacturers of files, rasps, etc., have awarded general contract to Polito Construction Co., 1601 Avenue P, for one-story plant to cost about $40,000 with equipment. Tillion & Tillion, 415 Lexington Avenue, New York, are architects.

Union Railway Co., 2396 Third Avenue, New York, will build a one-story car repair and equipment works, 34 x 192 ft., to cost about $40,000 with equipment. E. H. Faile is company architect.

Frank S. Parker, 119 West Fifty-seventh Street, New York, architect, has filed plans for a six-story automobile service, repair and garage building, 197 x 200 ft., to cost about $500,000 with equipment.

Dictograph Products Corporation, 220 West Forty-second Street, New York, manufacturer of sound equipment and devices, has awarded general contract to Barney Ahlers Construction Co., 110 West Fortieth Street, for new one-story plant, 100 x 100 ft., at Long Island City, to cost more than $80,000 with equipment.

Union Carbide & Carbon Corporation, 30 East Forty-second Street, New York, is arranging for new stock issue of about $53,000,000, considerable part of which will be used for expansion. Work will include a hydroelectric power project near Glen Ferris, W. Va., to cost about $20,000,000. Construction of power dam has been started and it is understood plant is scheduled for completion in 1930.

Metropolitan Refining Co., 570 Seventh Avenue, New York, manufacturer of oils, colors, paints, etc., is planning new one-story plant, 60 x 175 ft., to cost about $65,000 with equipment.

Thompson Interstate Airways Corporation, operating Pioneer Aero Training School, Flushing, N. Y., is arranging for construction of airport on 280-acre tract in Northvale and Rockleigh Boroughs, Bergen County, N. J., consisting of hangars, repair shops, oil storage and other units, to cost more than $500,000 with equipment.

Certain-Teed Products Corporation, 100 East Forty-second Street, New York, manufacturer of roofing, etc., has leased one-story building at Irvington, Newark, 70 x 228 ft., for new factory branch, storage and distributing plant.

Swan-Finch Oil Corporation, 205 East Forty-second Street, New York, will rebuild part of oil refinery at Linden, N. J., destroyed by fire Sept. 14.

Western Electric Co., 195 Broadway, New York, has filed plans for three new six-story units adjoining works at Kearny, N. J., to cost more than $500,000. Largest structure will be equipped for manufacture of telephone equipment and parts.

Sipp-Eastwood Co., Paterson, N. J., has been organized with capital of 14,500 shares of stock, no par value, to take over and consolidate Sipp Machine Co., and Benjamin Eastwood Co., both manufacturers of textile machinery and parts. Officers of former companies will continue with merged organization, and will carry out expansion.

L. P. Croce Bottling Works, Inc., 930 Summerfield Avenue, Asbury Park, N. J., will soon take bids on general contract for three-story addition, to cost about $65,000 with equipment. C. B. Cook, Asbury Park Trust Building, is architect.

Karl Krause United States Corporation, 114 East Thirteenth Street, New York, American distributor for Karl Krause, Leipzig, Germany, manufacturer of automatic paper cutters, embossing presses, bookbinding and box-making machinery,

is in market for motors for its machines. R. Sunderhauf is secretary.

Alfred Hofmann, West New York, N. J., through Lockwood Greene Engineers, Inc., New York, has awarded general contract to Auf-der-Heide Contracting Co. for machine shop, 100 x 125 ft., for servicing knitting machinery and manufacturing electric lamp and radio tube machinery.

Modern Machine Works, Inc., recently formed, has leased a building at 7 Market Street, Paterson, N. J., to manufacture silk dyeing, finishing, printing and special machinery.

Sound Equipment Corporation, 16 East Fortieth Street, New York, has been organized to manufacture talking picture equipment on contract.

Eureka Metal Finishing Co., Inc., has opened a plant at 1465 Long Avenue, Hillside, N. J.

Philadelphia

PHILADELPHIA, Sept. 16.—Contract has been let by Griffith Tool Works, Second and Duncannon Streets, Philadelphia, to Albert F. Forster, 5440 North Mascher Street, for two-story addition, to cost about $25,000 with equipment.

United States Gypsum Co., 1500 Walnut Street, Philadelphia, with headquarters at Chicago, manufacturer of building products, has plans for an addition to local works, to cost about $150,000 with equipment.

Chester Auto Parts & Machine Co., Chester Pike, Ridley Park, Pa., has awarded general contract to M. Chester Campbell, 111 Market Avenue, for one-story addition, to cost about $30,000 with equipment.

Crane Co., 1301 Locust Street, Philadelphia, has plans for one-story factory branch and distributing plant, to cost about $85,000 with equipment. Headquarters are at Chicago. M. D. Robinson is manager at Philadelphia.

Pennsylvania Railroad Co., Philadelphia, will install elevating, conveying and other mechanical-handling equipment in three-story central freight terminal at Harrisburg, Pa., to cost about $100,000. T. J. Skillman is chief engineer.

Florence Pipe Foundry & Machine Co., Florence, N. J., has asked bids on general contract for one-story addition, to cost over $35,000 with equipment.

General Aero Corporation, operating Holmes Airport, Astoria, L. I., has purchased Amatol Speedway, Hammonton, near Atlantic City, N. J., totaling 500 acres, and plans airport and flying field at that location, including hangars, repair shop and other field units, to cost more than $300,000 with equipment. Clarence B. Chamberlain is consulting aeronautical engineer for company.

Board of Trustees, Pennsylvania State College, State College, Pa., will soon call for bids for new power plant, to cost more than $80,000 with equipment. Charles Z. Klauder, 1429 Walnut Street, Philadelphia, is architect; J. G. White Engineering Corporation, 43 Exchange Place, New York, is engineer.

Pusey & Jones Corporation, Wilmington, Del., has authorized an expansion and improvement program in shipbuilding department to cost about $250,000, including new building equipped with electric cranes and other machinery. Clement C. Smith is president.

New England

BOSTON, Sept. 16.—The past week was quiet with the majority of local machine tool dealers. Sales of new tools were mostly in lathes. Dealers state, however, that some promising inquiries have developed, but details are withheld. A few presses, lathes, milling machines and bench equipment were sold by used tool houses. Many machine tool builders have sufficient business booked to keep plants operating at capacity during the remainder of 1929 and some are booked well ahead into 1930.

F. S. Payne Co., 30 Richdale Avenue, Cambridge, Mass., has closed bids on a two-story, 50 x 100 ft., machine shop addition.

Martin Trailer Co., Westfield, Mass., has plans for a one-story factory, 80 x 100 ft., to cost $40,000 without equipment.

Chicopee, Mass., is taking bids for repairs and alterations to its electric lighting plant. Equipment will be purchased.

Bridgeport Boiler Works Co., 202 Housatonic Avenue, Bridgeport, Conn., has filed plans for a one-story addition, 100 x 116 ft., to cost $21,000 without equipment.

National Blank Book Co., Water Street, Holyoke, Mass., has plans for a five-story addition, 60 x 150 ft. Motors and miscellaneous equipment will be purchased.

Hartford Bearings Co., 603 Franklin Avenue, Hartford, Conn., has been organized to manufacture press metal bearings and sheet stampings.

Wilbert J. Nichols, 24 Center St., North Adams, Mass., has filed plans for a coal elevator to replace one recently destroyed by fire. Coal handling equipment will be purchased.

Chapman Valve Mfg. Co., Indian Orchard, Mass., is contemplating a foundry addition.

Following recent purchase of Everett Mills at Lawrence, Mass., for radio tube and equipment manufacture, Noma Electric Corporation, 340 Hudson Street, New York, affiliated with Pilot Radio & Tube Co., has acquired plant and business of New England Wire Co., Westfield, Mass., and will continue operations as a subsidiary. Plant has output of 200,000,000 ft. wire per annum, and large part of production will be used by purchasing company at new plant at Lawrence.

United States Rubber Co., Providence, R. I., will soon begin superstructure for one-story addition to local mill, 100 x 300 ft., to cost about $100,000 with equipment. General contract has been let to Cruise Construction Co., Pawtucket, R. I. Headquarters of company are at Broadway and Fifty-eighth Street, New York.

Warren Telechron Co., Ashland, Mass., manufacturer of bells, clocks, etc., a subsidiary of General Electric Co., is planning call for bids on general contract for one-story addition, to cost more than $50,000 with equipment. Fay, Spofford & Thorndike, 44 School Street, Boston, are engineers.

City Council, Bristol, Conn., is planning purchase of 84-acre tract at East Bristol as site for municipal airport, to include hangars, and mechanical field units, to cost about $100,000 with equuipment.

Eastern Massachusetts Electric Co., Washington Street, Salem, Mass., has plans for a superpower steam-operated electric generating station near local pier of Philadelphia & Reading Railway, to cost more than $10,000,000 with transmission lines. Property is operated under direction of Charles H. Tenney & Co., 200 Devonshire Street, Boston, Mass., engineers, and plans will be prepared at offices of that organization. Work is scheduled to begin early next year.

Pittsburgh

PITTSBURGH, Sept. 16.—Machine tool business has been fairly good this month, despite the fact that a number of purchases are definitely deferred until after the machine tool exhibit in Cleveland. It is reported that the largest buyer of tools in this district will send nearly 100 representatives to the show to check up on new developments before issuing inquiries for tools. The United States Aluminum Co., New Kensington, Pa., is placing tools for its new machine shop and will probably complete purchases before the end of the month. The Westinghouse Electric & Mfg. Co. will soon issue its fourth quarter list. Railroad buying has been lacking in the past few weeks, but is expected to improve as the carriers begin purchasing rails and other materials.

The extremely large backlogs of the heavy machinery makers in this district continue a feature of the market and at least two large manufacturers of steel mill equipment are reported to have enough orders for a year's operation. Additional business is being booked regularly and the problem of delivery is becoming more serious. Many steel companies will buy considerable more equipment than usual for replacement purposes as the high operations over the greater part of the year have tested facilities to the utmost.

Bradford Transit Co., Bradford, Pa., has been formed by officials of Tidewater Pipe Line Co. and South Penn Oil Co., 545 William Penn Way, Pittsburgh, and will be operated as subsidiary. Company will take over pipe lines of both organizations, totaling about 898 miles, and refinery of Emery Mfg. Co., Bradford, manufacturer of lubricating oils, etc. Expansion is planned including refinery extensions and additional pipe lines.

General Motors Corporation, Detroit, has plans by Albert Kahn, Inc., Marquette Building, architect and engineer, for one and two-story parts and service building, 145 x 215 ft., at Pittsburgh, to cost about $150,000 with equipment.

Carnegie Forge & Tool Co., Pittsburgh, care of Allen H. Kerr, 1108 Commonwealth Building, treasurer, recently formed by Mr. Kerr and associates with capital of $25,000, is said to be planning operation of local factory to manufacture tools and kindred products.

Board of Education, Beaver Falls, Pa., is contemplating manual training equipment in two and three-story high school to cost $230,000, for which plans are being completed by Carlisle & Sharrer, Martin Building, Pittsburgh, architects.

Katona Mining Co., 1241 Charleston Avenue, Huntington, W. Va., Samuel W. Perry, president, recently organized by Mr. Perry and associates, has acquired coal properties near East Lynn, W. Va., and plan construction of tipple, power house and other units, and installation of mining equipment. A 1½ mile standard gage railroad will be built. Entire project is reported to cost more than $125,000.

Air-Way Electric Appliance Corporation, Toledo, Ohio, manufacturer of electric heating and kindred equipment, has

purchased plant and business of Erie Heating System, Inc., Erie, Pa., and will consolidate. Plant will be removed to Toledo works, which will be expanded, and products of acquired company will be manufactured under name of Air-Way heating system.

Chicago

CHICAGO, Sept. 16.—The curve of machine tool sales for the past week is upward following a substantial volume of business of a widely diversified character. Farm implement manufacturers are signifying their need for miscellaneous items. The list of the International Harvester Co. for its Farmall works is reported to have been completed except for a few tool room machines, on which deliveries were not an important factor in making early purchases. Fresh inquiry is widespread and for the most part for single tools. The Pullman Company's list for Buffalo is holding the attention of dealers as it is the only list of size that is now before the local trade.

Additional requests for prices for budgets have been made by the railroads, which at the moment have almost wholly withdrawn from the market in the matter of placing orders.

Prices and deliveries remain stationary. The used tool market is active, the number and variety of machines sought being in excess of the available supply.

Scully Steel & Iron Co., 2364 South Ashland Avenue, Chicago, will build a one-story warehouse, 105 x 221 ft., to cost $30,000. G. Barry, 180 North Michigan Avenue, is architect.

Gary Screw & Bolt Co., 2217 West Forty-third Street, Chicago, will erect a one-story shop, 40 x 50 ft. John Boeringer, 53 West Jackson Boulevard, is architect.

Faith Mfg. Co., 2531 North Ashland Avenue, Chicago, manufacturer of radiator caps and kindred metal products, has asked bids on general contract for two-story plant unit, to cost about $45,000 with equipment.

Barco Mfg. Co., 1777 Winnemac Avenue, Chicago, manufacturer of railroad supplies and equipment, has plans for a three-story addition, 50 x 225 ft., to cost about $140,000 with equipment. R. E. Pingrey & Co., 134 South La Salle Street, are architects.

Carlson, Holmes & Bromstad, Inc., 3231 West Thirtieth Street, Chicago, manufacturer of cabinets, etc., has acquired for expansion one and two-story plant at Thirty-first Street and Kedzie Avenue, on site, 598 x 600 ft.

Modern Handy Button Machine Co., 2407 West Ohio Street, Chicago, has awarded general contract to Louis Padorr & Son, 33 North La Salle Street, for one-story addition to cost about $40,000 with equipment. Harry Glube, 360 North Michigan Avenue, is architect.

City Council, Muscatine, Iowa, is considering extensions and improvements in municipal electric light and power plant, to cost about $80,000 with equipment. Burns & McDonnell Engineering Co., Interstate Building, Kansas City, Mo., is engineer.

Davenport Airways, Inc., Davenport, Iowa, care of N. H. Tunnicliff, Citizens Building, representative, has plans for an airport and flying field at Cramfield, near city limits, including hangars, and mechanical field units, to cost about $100,000 with equipment.

The Crane Market

INQUIRY for overhead traveling cranes has been small since the first of the month, but there is a substantial number of inquiries pending award. The Amtorg Trading Corporation, New York, is inquiring for a 20-ton hand power crane for export to Russia. The Union Drydocks, Inc., Port Richmond, S. I., New York, which recently inquired for two small capacity overhead cranes, has postponed purchase until after Jan. 1.

Bowman Dairy Co., River Forest, Ill., has plans drawn for a two-story bottling plant and power house, 200 x 320 ft., to cost about $500,000 with equipment. Frank B. Gray, 73 South La Salle Street, Chicago, is architect.

Board of Education, Emmettsburg, Iowa, is considering installation of manual training equipment in two and three-story senior and junior high school, to cost $170,000, for which plans will be drawn by Keffer & Jones, Masonic Temple, Des Moines, Iowa.

Gardner-Denver Co., Quincy, Ill., manufacturer of slush pumps, air compressors, pneumatic tools, drill sharpeners and high-pressure drill steel forges, has let general contract for an addition to increase production facilities 50 per cent.

South Atlantic

BALTIMORE, Sept. 16.—Aviation Corporation of the Americas, Inc., 100 East Forty-second Street, New York, operating Fairchild Airplane Mfg. Co., 270 West Thirty-eighth Street, and other aircraft units, has taken option on 500-acre tract on Back River, near Todd's Point, Baltimore, as site for new plant to manufacture all-metal flying boats and other combination sea and aircraft. Initial works will comprise units for parts production and assembling, to cost about $750,000 with equipment. Graham B. Grosvenor is president.

Horace E. Dodge Boat & Plane Corporation, care of J. Gilmore Fletcher, 511 Fifth Avenue, New York, vice-president and managing director, has purchased 100-acre tract at Newport News, Va., as site for new plant to manufacture motorboats, flying boats, amphibian airplanes and kindred seacraft. Works will include buildings for parts manufacture and assembling, and will cost about $1,000,000 with equipment. Horace E. Dodge, Jr., is president.

General Gas & Electric Corporation, 50 Pine Street, New York, operating Lexington Water Power Co., Lexington, S. C., and other utilities, has arranged for a preferred stock issue to total $14,850,000, part of proceeds to be used for expansion, including hydroelectric power development in South Carolina. Work is under way on hydroelectric generating station near Columbia, S. C., to have initial capacity of 130,000 kw. Project will include transmission system.

Interstate Milling Co., West Tenth Street, Charlotte, N. C., has plans for addition to feed milling plant to cost about $70,000, including elevating, conveying, screening and other equipment.

McClaren Rubber Co., Charlotte, N. C., has plans for expansion, including installation of additional equipment, to cost over $40,000.

Walter Dobbins, Aiken, S. C., is at head of project to construct an ice-manufacturing plant at Spartanburg, S. C., to cost about $65,000 with machinery.

Kraft-Phenix Cheese Corporation, 400 Rush Street, Chicago, plans installation of conveying equipment and other machinery at milk condensing plant at West Jefferson, N. C.; a power house is proposed. Entire project will cost about $100,000.

City Council, Kinston, N. C., is considering extensions and improvements in municipal electric light and power plant, to cost about $100,000 including equipment.

Old Dominion Manganese Corporation, Crimora, Va., will make extensions and improvements in local manganese properties and install additional mining equipment.

Detroit

DETROIT, Sept. 16.—Contract has been let by Grand Trunk Railway System, 400 East Jefferson Avenue, Detroit, to Ellington Miller Co., 417 South Dearborn Street, for engine house, machine shops and power house at Pontiac, Mich., to cost about $100,000 with equipment.

Wayne County Board of Commissioners, Barium Tower, Detroit, is asking bids until Sept. 23 for pumping plant to cost more than $400,000. F. S. Slater, 16134 Princeton Avenue, is architect; Hubbell, Hartgering & Roth, Buhl Building, are engineers.

Michigan Brass & Iron Works, Lansing, Mich., has resumed production following recent fire. New units have been built and capacity will be increased. Company is considering erection of a one-story addition on adjoining site for its brass division, which is now operated as a separate unit elsewhere, to cost more than $60,000.

Bull Dog Electric Products Co., 7610 Joseph Campau Avenue, Detroit, manufacturer of electric switches and kindred products, is said to be planning new one-story machine shop, to cost about $45,000 with equipment.

Battle Creek Gas Co., Battle Creek, Mich., has awarded general contract to S. B. Cole & Son, Inc., local, for three-story and basement equipment storage and distributing plant, 95 x 100 ft., with repair division, to cost about $140,000 with equipment.

State of Michigan Boys' Vocational School, 400 North Pennsylvania Avenue, Lansing, will soon take bids for two-story vocational school, to cost about $200,000 with equipment. Bowd & Munson, Wilson Building, are architects; McColl, Snyder & McLean, Penobscot Building, are mechanical engineers.

Wolverine Bolt Co., 9660 French Road, Detroit, has asked bids on general contract for one-story plant unit, to cost about $70,000 with equipment. D. B. Ireland is secretary and treasurer.

Detroit Stoker Co., General Motors Building, Detroit, is said to be planning a two-story addition to plant at Monroe, Mich., to cost about $30,000 with equipment.

Department of Public Lighting, 174 East Atwater Street, Detroit, has awarded general contract to Gallagher & Fleming Co., 6500 Epworth Boulevard, for one-story equipment storage and distributing plant, to cost about $34,000 with equipment. Smith, Hinchman & Grylls, Marquette Building, are architects.

Buffalo

BUFFALO, Sept. 16.—National Lime, Cement & By-Products Corporation, Stock Exchange Building, Buffalo, will soon break ground for new plant near Tuscumbia, Ala., for lime production. Project will include large crushing plant, and will cost more than $200,000 with machinery. Soule & Zepp, 507 North Charles Street, Baltimore, are consulting engineers. Thomas K. Morris is vice-president.

North American Lloyd Aircraft Corporation, 535 Fifth Avenue, New York, has plans for airport at Jamestown, N. Y., including hangar, with repair facilities and other buildings, to cost about $100,000 with equipment. F. D. Amory, Jr., 551 Fifth Avenue, New York, is architect.

Brewer-Titchener Corporation, Cortland, N. Y., manufacturer of automobile equipment and accessories, has awarded general contract to Austin Co. for one-story addition, to cost about $50,000 with equipment.

American LaFrance-Foamite Corporation, Elmira, N. Y., manufacturer of fire engines, trucks, etc., has asked bids on general contract for one-story addition, to cost about $55,000 with equipment. Haskell & Considine, Hulett Building, are architects.

Department of Public Works, Municipal Building, Buffalo, will soon begin construction of municipal marine airport, including shops for repair and reconditioning, to cost about $150,000 with equipment. Col. Howard Beck, Hoyler Building, is city architect.

Cleveland

CLEVELAND, Sept. 16.—The machine tool market was rather quiet the past week, in both orders and inquiries. There is increasing evidence that prospective business is being held back until after the Machine Tool Builders' Exhibition to be held in Cleveland the week of Sept. 30, and a further tapering off is looked for during the remainder of the month. Machine tools and other equipment shown here last week at the National Metal Congress attracted much interest and resulted in the placing of a number of orders.

Champion Machine & Forging Co., Cleveland, has awarded a contract for a boiler house which is first unit of a large addition. A 1000-hp. boiler and auxiliary equipment will be installed.

National Screw & Mfg. Co., Cleveland, will erect an addition to its Grant Avenue plant.

Contract has been let by Gluntz Brass Foundry Co., East 108th and Harvard Avenues, Cleveland, to J. H. O'Grady, 2008 Rosamer Road, for one-story machine shop, to cost about $35,000 with equipment.

Firestone Tire & Rubber Co., Akron, Ohio, has awarded general contract to Burger Iron Co., Akron, for seven-story addition, 110 x 180 ft., to cost about $750,000, of which about $350,000 will be expended for equipment.

Electric Products Co., 1725 Clarkstone Road, Cleveland, has awarded general contract to A. M. Higley Co., Plymouth Building, for two-story addition, 80 x 100 ft., to cost about $60,000 with equipment. H. M. Morse Co., 750 Prospect Street, is architect and engineer.

City Council, Painesville, Ohio, has plans for extensions and improvements in municipal electric light and power house, including installation of 2500-kw. turbo-generator and auxiliary equipment, to cost about $75,000. Hadlow, Hughes, Hick & Conrad, Inc., 850 Euclid Avenue, Cleveland, is engineer.

Colonial Iron Works Co., 17643 St. Clair Avenue, Cleveland, has plans for one-story addition, 100 x 150 ft., to cost about $55,000 with equipment.

Westinghouse Electric & Mfg. Co., East Pittsburgh, has purchased Bissell Electric Co., Toledo, Ohio, and will operate as unit, primarily for storage and distribution.

Sands Mfg. Co., 5407 Sweeney Avenue, Cleveland, manufacturer of water heaters, etc., has awarded general contract to Bolton-Pratt Construction Co., Columbia Building, for one-story addition, 65 x 70 ft., to cost about $45,000 with equipment.

Indiana

INDIANAPOLIS, Sept. 16.—Contract has been let by American Coating Mills Co., Division Street, Elkhart, to George C. Kistner, 514 South Main Street, for one-story addition to paper mill, to cost about $40,000 with equipment.

Indianapolis Cage Corporation, Indianapolis, recently organized with capital of $50,000 to manufacture bird cages and stands and other metal products, will operate a factory at Seventeenth Street and Kent Avenue. Benjamin D. Aufderheide is one of heads of company.

Board of Education, Terre Haute, is considering installation of manual training equipment in two-story and basement addition to McLean Junior High School, to cost $200,000. George J. Stoner & Co., Chamber of Commerce Building, are architects.

Northern Indiana Public Service Co., Hammond, has arranged for a bond issue of $15,500,000, part of fund to be used for extensions and improvements in plants and system.

Bendix Brake Co., South Bend, manufacturer of four-wheel brakes for automobiles, has awarded general contract to H. G. Christman Co., 306 South Notre Dame Street, for two-story and basement addition, 42 x 150 ft., to cost about $45,000 with equipment.

Traveling ovens, power equipment, conveying and other machinery will be installed in one-story and basement plant, 125 x 158 ft., to be built by General Baking Co., 420 Lexington Avenue, New York, at Indianapolis, for which contract for superstructure has been let to W. B. Bellows Construction Co., Oklahoma City, Okla., to cost about $200,000. Archer & Gloyd, Inc., Pioneer Trust Building, Kansas City, Mo., are architects.

Firestone Tire & Rubber Co., Akron, Ohio, has plans for multi-story factory branch, storage and distributing plant at Kokomo, to cost about $80,000 with equipment. Bishop, Knowlton & Carson, 312 North Meridian Street, Indianapolis, are architects.

International Fork & Hoe Co., Fort Wayne, has leased buildings and equipment of Sperry Mfg. Co., New Haven, Ind., and will manufacture farm and garden implements and tools. H. E. Frame, formerly with National Handle Co., Fort Wayne, will be in charge.

Haynes Stellite Co., Kokomo, Ind., is taking bids for a new foundry and expects to be in production about Jan. 1. A warehouse will also be erected.

Quaker Maid Co., Terre Haute, has broken ground for group of buildings to cost $750,000. General contract has been awarded to Thomas A. Moynahan Co., Indianapolis.

Gulf States

BIRMINGHAM, Sept. 16.—Work will soon begin by Kansas City Southern Railway Co., Kansas City, Mo., on shops for new terminal at Beaumont, Tex., to include engine house, locomotive repair shops, machine shops and other units, entire project to cost about $1,000,000 with equipment.

Texas Machine & Foundry Co., Rigsby Street, San Antonio, Tex., has plans for two one-story machine shops, to cost about $30,000 with equipment.

E. G. Beaumont, formerly president and general manager of H. L. Wilson Hardware Co., Beaumont, lately acquired by Peden Iron & Steel Co., Houston, Tex., has awarded general contract to Christy-Dolph Construction Co., Beaumont, for one-story automobile service, repair and garage building, to cost about $100,000 with equipment.

Orient Petroleum, Harvey-Snider Building, Wichita Falls, Tex., will soon begin extensions and improvements in local oil refinery, including installation of equipment for gasoline production, to cost about $500,000. Company is a subsidiary of Atlantic-Pacific & Gulf Oil Co., Kansas City, Mo.

Swift & Co., Chicago, have plans for three-story meat-packing plant at Paris, Tex., with installation of refrigerating equipment, conveying and other equipment, to cost about $150,000.

Aero & Auto Engineering Co., Tampa, Fla., F. L. Ludwig, general manager, has leased 40-acre tract in Hillsborough Bay district, for establishment of flying school and airport, including hangars, repair shops, oil storage and other units, to cost about $100,000 with equipment.

Board of Education, San Antonio, Tex., is considering installation of manual training equipment in new three-story high school, to cost $160,000, for which plans have been completed by Harvey P. Smith, National Bank of Commerce Building, architect; W. E. Simpson Co., Milam Building, is engineer.

Texas & Pacific Railroad Co., Dallas, Tex., has begun grading site for engine terminal at Big Spring, Tex., and will start work on group of 13 one-story buildings in about 90 days, including engine house, machine shop, forge shop, locomotive boiler and plate shop, power house and other units, entire project to cost more than $400,000 with equipment. E. F. Mitchell is chief engineer.

American Cast Iron Pipe Co., 2930 North Sixteenth Street, Birmingham, has filed plans for two one-story additions, to cost about $45,000 with equipment.

Louisiana Ice & Utilities Co., Inc., Alexandria, La., has plans for three-story ice-manufacturing and refrigerating plant, including car-icing division, to cost about $100,000 with equipment. Samuel Stone, Jr., & Co., Masonic Temple, New Orleans, are architects.

Bent Concrete Pipe Co., Grosse Building, Los Angeles, manufacturer of reinforced concrete pipe, has begun initial building for new plant at West Dallas, Tex., where 10-acre tract was recently acquired, to cost $100,000 with equipment. Other units

will be built later, entire project to cost over $500,000.

Rio Grande Oil Co., 525 East Seventh Street, El Paso, Tex., has plans for new refinery adjoining present plant, to cost more than $500,000 with machinery.

Cincinnati

CINCINNATI, Sept. 16.—Although demand for heavy machines continues fairly brisk, district manufacturers report a slight recession in the call for light tools. In fact, one leading maker of lathes indicates that fresh bookings the past week declined noticeably. Builders of planers, boring mills and similar tools, however, report that orders so far this month are in greater number than in the same period last month and in some instances total more than the entire month of August. Nevertheless, the number of unfilled orders is still large, some manufacturers having sufficient business booked to maintain present rate of production the remainder of the year.

American Bridge Co., Pittsburgh, is in the market for four planers and the Niagara Machine Tool Co., Niagara Falls, N. Y., is inquiring for one large planer. The Big Four Railroad has placed an order with a local manufacturer for a 16-in. and a 36-in. lathe for its Louisville shops. Westinghouse Electric & Mfg. Co., and Edward G. Budd Mfg. Co., of Philadelphia, have each closed for one 60-in. planer. Hershey Lumber Co., Hershey, Pa., has ordered a 24-in. planer and United Fruit Co. has purchased a 36-in. planer for shipment to Cuba. A German company has placed an order with a local manufacturer for two 16-in. automatic lathes.

Delco Products Co., Dayton, Ohio, manufacturer of isolated electric lighting plants, electric lighting and starting equipment for automobiles, etc., is planning expansion, including five-story factory unit to cost about $200,000 with equipment.

Burkett Closed Body Corporation, 541 Master Avenue, Dayton, Ohio, manufacturer of automobile bodies, is contemplating erection of new plant, to cost more than $100,000 with equipment.

Standard-Coosa-Thatcher Co., Chattanooga, Tenn., manufacturer of textile products, has begun work on one-story machine shop for repair work and parts replacements, to cost about $45,000 with equipment.

Plough, Inc., 121 South Third Street, Memphis, Tenn., manufacturer of industrial chemicals, etc., has asked bids on general contract for five-story plant to cost about $1,000,000 with machinery. Hanker & Cairns, Court Square Building, are architects.

International Derrick & Equipment Co., Columbus, Ohio, has purchased Boykin Machinery & Supply Co., Beaumont, Tex., and will expand and operate as unit of organization. B. Boykin, Jr., will be vice-president and general manager.

Model Milling Co., Johnson City, Tenn., is contemplating erection of new grain elevator and feed milling plant, including installation of elevating, conveying, screening and other equipment, to cost more than $250,000. George L. Carter is head.

Master Electric Co., Linden Avenue, Dayton, Ohio, manufacturer of electrical equipment, is clearing site for additions, one unit to be used for foundry, entire project to cost about $200,000 with equipment. E. A. Hart, Third National Bank Building, is architect.

Ideal Foundry & Machine Co., recently organized, is operating a foundry at 900 Albany Street, Dayton, manufacturing light gray iron and semi-steel castings. J. M. Conroy is president.

St. Louis

ST. LOUIS, Sept. 16.—Plans are under way by Glasco Electric Co., Kansas City, Mo., care of Victor J. DeFoe, 114 West Tenth Street, architect, for one-story plant, 100 x 110 ft., to manufacture electrical equipment, to cost more than $40,000 with equipment.

Ace Automatic Machine Corporation, Kansas City, Mo., care of James W. Johnson, 5421 Montgall Street, recently formed by Mr. Johnson and associates, plans operation of factory to manufacture coin-operated machines, including patented moving target machines, parts, etc.

Board of Education, East St. Louis, Ill., has plans for two and three-story junior high school and has authorized group of shops for manual training, to cost more than $300,000. W. J. Kennedy, First National Bank, East St. Louis, is architect; N. S. Spencer & Son, 180 North Michigan Avenue, Chicago, are associate architects.

Western Air Express, Inc., 117 West Ninth Street, Los Angeles, will carry out expansion at airport at Alva, Okla., to include construction of hangar, 100 x 120 ft., with repair and reconditioning shop facilities and other structures, to cost over $70,000.

Packard Motor Car Co., East Grand Boulevard, Detroit, has plans for three-story service, repair and garage building at Kansas City, Mo., to cost over $175,000 with equipment.

Shaffer Specialty Co., 113 South Denver Street, Tulsa, Okla., manufacturer of mechanical equipment, has awarded general contract to Oklahoma Building & Investment Co., Boston Building, for one-story machine shop, 50 x 100 ft., to cost about $28,000 with equipment.

City Council, Seminole, Okla., is planning a municipal electric light and power plant, using Diesel engine-generator unit, to cost $65,000 with equipment. R. N. Green, Seminole, is engineer.

De Camp Consolidated Glass Casket Co., Muskogee National Bank Building, Muskogee, Okla., is planning three-story addition, 75 x 150 ft., to cost about $50,000 with equipment.

Nebraska Power Co., Electric Building, Omaha, Neb., is planning addition to local steam-operated electric power plant, to cost about $100,000 with equipment.

Northwestern Iron & Metal Co., 910 T Street, Lincoln, Neb., has awarded general contract to W. J. Assenmacher Co., 625 North Seventh Street, for one-story and basement storage and distributing plant, 50 x 140 ft., to cost about $25,000 with equipment.

Oklahoma Gas & Electric Co., Insurance Building, Oklahoma City, Okla., has plans for a steam-operated electric generating plant unit at Belle Isle Park, near city, to cost about $800,000. Byllesby Engineering Co., 231 South La Salle Street, Chicago, is engineer.

Multiplex Faucet Co., 4325 Duncan Avenue, St. Louis, manufacturer of special beverage dispensing equipment, is erecting a third story on its two-story plant, with investment of $18,000 in building and equipment.

Central Brass & Aluminum Foundry Co., Twenty-first and Randolph Streets, St. Louis, is erecting a one-story addition, 33 x 59 ft., to cost $4,000.

Universal Vapor Spray Mfg. Co., Inc., 308 North Robinson Street, Oklahoma City, Okla., has awarded contract to Morris Mfg. Co., El Reno, Okla., for manufacture of metal vegetable display racks to be sold by former.

Milwaukee

MILWAUKEE, Sept. 16.—A slight decrease in the volume of machine tool sales is noted, notwithstanding peak production in almost all metal-working industries. Inquiries are larger compared with recent weeks. Employment figures show an increase of about 15 per cent over last year's totals and no decrease from the July high mark.

Demand is steady from manufacturers of power producing and transmission equipment, agricultural implements and automobile parts and accessories, but automobile manufacturers have not yet entered this market to any great extent. Sale of used tools is increasing.

Rundle Mfg. Co., Milwaukee, manufacturer of plumbing supplies and enameled sanitary ware, has begun work on new storage yard to cost about $75,000, including conveyors and other equipment. A. A. Wickland & Co., Chicago, are consulting engineers.

United Iron & Metal Co., Milwaukee, will have a new plant, office and shop built by Paul Realty Co., local, to cost about $40,000 complete.

Board of Vocational Education, Racine, Wis., is asking bids on plans by Frank J. Hoffman, architect, James Block, local, for new vocational school, three stories, 68 x 128 ft. T. S. Rees is director.

Board of Regents, University of Wisconsin, Madison, has let contracts for mechanical engineering building to J. H. Findorff & Son, local. It will be three stories, 230 x 230 ft., irregular. Plans are by Arthur Peabody, Madison, State architect.

Pacific Coast

SAN FRANCISCO, Sept. 12.—Contract has been awarded by Port Stockton Cement Co., Claus Spreckels Building, San Francisco, to MacDonald Engineering Co., 149 California Street, for new mill at Stockton, Cal., to cost over $1,000,000 with equipment. E. A. Roberts and W. C. Stevenson are company engineers.

Fresno Auto Body & Fender Works, Inc., 1919 Calaveras Street, Fresno, Cal., has plans for new one-story plant, to cost about $50,000 with equipment. E. J. Kump Co., Rowell Building, is architect.

Warman Steel Casting Co., 6100 South Boyle Avenue, Vernon, Cal., has filed plans for a one-story foundry addition, including crane runway.

Anderson Barngrover Mfg. Co., West Julian Street, San Jose, Cal., manufacturer of fruit-handling and kindred machinery, has plans for a one-story unit, 85 x 215 ft., for assembling, to cost about $50,000. Charles McKenzie, Towhy Building, is architect.

Crown Willamette Paper Co., 248 Battery Street, San Francisco, has plans for new unit for production of bleached pulp at Camas, Wash., in connection with an

expansion program at plant, to cost more than $3,000,000 with equipment.

Paper Makers' Chemical Co., Kalamazoo, Mich., manufacturer of industrial chemicals, has engaged Austin Co., Portland, Ore., to prepare plans for new plant on 7-acre tract, recently acquired in Guilds Lake district, Portland, to cost about $275,000 with equipment. W. J. Lawrence is president.

Salinas Cold Storage Co., Monterey, Cal., has plans for new cold storage and refrigerating plant at Castroville, Cal., to cost about $200,000 with machinery. Engineering department of company is in charge.

Durant Motor Co. of California, Inc., East Fourteenth Street, Oakland, Cal., has filed plans for a one-story addition, to cost about $60,000 with equipment.

Aircraft Industries, Inc., San Francisco, recently organized by G. L. Bush, president of Bush Electric Co., San Francisco, and W. F. Beard, Modesto, Cal., is planning construction of new aircraft manufacturing plant near Waterford Road, Modesto, with units for parts production and assembling, to cost about $65,000 with equipment.

Spring Street Iron Works, Klamath Falls, Ore., will erect a new plant, 99 x 154 ft., to replace a structure recently destroyed by fire. Completion is scheduled within two months.

Pacific Rockwood Co., Central Building, Seattle, Wash., has been incorporated to acquire local business of Rockwood Sprinkler Co. and to conduct a general fire protection equipment contracting business. Company is in market for all classes and types of iron pipe and fittings, valves, etc. B. H. Lewis is president.

Canada

TORONTO, Sept. 16.—General Motors of Canada, Oshawa, Ont., will start work within two weeks on erection of a parts and service building three stories and basement, with floor space of about 87,000 square feet.

Skinner Co., Ltd., Gananoque, Ont., manufacturers of automobile bumpers, etc., has awarded general contract to Ferguson Contracting Co., Ltd., Confederation Life Building, Toronto, for plant at Oshawa, Ont. Equipment has not yet been purchased.

Standard Brick Co., Ltd., Toronto, has purchased seven acres near Oshawa, and expects to start work at once on erection of a plant.

Steel Equipment Co., Ltd., 360 Steel Street, Pembroke, Ont., has awarded contract to Walter Beatty Esate, 125 Pembroke Street, for an addition to cost $30,000. J. A. Ewart, Jackson Building, Ottawa, is architect.

United Mfg. Co., 1470 Peel Street, Montreal, has plans for a three-story manufacturing building at Cap de la Madeleine, Que., to cost $50,000.

Construction has been started on a beaver board plant at Donnaconia, Que., for Price Brothers Co., Ltd., to cost $1,000,000. Main building will be two stories, 150 x 400 ft.

Western Canada

Western Foundries, Ltd., has purchased a four-acre site at Lethbridge, Alberta, and is erecting a plant to manufacture highway machinery, oil and mine drilling equipment, cast iron water pipe, brass and bronze castings, etc.

Contracts will be awarded soon by Dominion Bridge Co. for construction of its structural steel fabricating plant on 38-acre site at Burrard Inlet, Vancouver, B. C. It will be electrically operated and will cost $1,500,000.

Foreign

EXPANSION in manufacturing is planned by Columbia Graphophone Co., Ltd., London, England, covering production of radio equipment and sets. Investment for manufacturing facilities during next 12 months is estimated at more than £500,000 (about $2,500,000). L. S. Sterling is managing director.

Soviet Precision Machinery Trust, Soviet Russian Government, Moscow, represented by Amtorg Trading Corporation, 261 Fifth Avenue, New York, will build a plant at Moscow to manufacture American type dollar watches and alarm clocks. Negotiations have been completed for purchase of machinery at plants of Dueber-Hampden Watch Co., Canton, Ohio, and Ansonia Clock Co., 397 Seventh Avenue, Brooklyn, N. Y., which will be shipped to new plant site at once; additional equipment will be provided for large capacity.

C. E. Matens, head of Mejia, Ray & Co., Bogota, Colombia, importers of mechanical equipment, etc., is planning expansion and is desirous of getting in touch with American manufacturers of road-building machinery, agricultural and woodworking machinery, hardware products, electrical fixtures, etc.

Burmeister & Wain Shipyard, Copenhagen, Denmark, has arranged for increase in capital from 30,000,000 to 35,000,000 kroner (about $8,350,000) part of proceeds to be used for expansion.

Credito Nacional Peninsular y Americano, Madrid, Spain, operating oil properties, has purchased plants and oil lands of Falcon Oil Corporation in Lake Maracaibo district, Venezuela, including concessions for 293,000 acres in section noted, as well as 93,000 acres in State of Monagas, eastern Venezuela. Acquired company has output of about 4000 bbl. daily, and increase in output is planned.

Reynaldo Yruegas, Hidalgo 108, Lampazos, N. L., Mexico, is in the market for 1 and 2-hp. motors of American manufacture, also for an isolated electric-lighting plant.

New Trade Publications

Crawler Equipment.—Northwest Engineering Company, 28 East Jackson Boulevard, Chicago. Catalog of 100 pages with many illustrations in color of the use of shovels, drag lines, pull shovels and skimmer-scoops. Also contains details of construction and assembly of the various types of machines and describes gasoline and electric power plants used in this equipment. Complete tables are included, giving operating ranges, crane lifting capacities and clearance diagrams.

Compression Resistors and Controllers.—Allen-Bradley Co., Milwaukee. Eight-page leaflet describing the organization and development of this company, the manufacture of graphite disks, descriptions of mechanical and electrical departments, as well as the research division and an outline of employee welfare activities.

Steel Castings.—Farrell-Cheek Steel Foundry Co., Sandusky, Ohio. A very attractive 16-page bulletin describes "Farrell's 85 Cast Steel." It is profusely illustrated, showing different types of castings, in which this special steel of high tensile strength and yield point in five different grades, is incorporated. The products include digger teeth; bucket parts; tooth gears and pinions, as well as wheels; sprockets, sheaves and rollers; crawler and accessory parts, and miscellaneous castings. The superior properties claimed for this steel in the various parts mentioned are discussed.

Steel Castings.—Sivyer Steel Casting Co., Milwaukee. A four-page illustrated leaflet describes in particular electric alloy trusswheels, known as Athey, for the use of transporting large trees in the Redwood forests of California.

Perforated Metals.—Hendrick Mfg. Co., Carbondale, Pa. A catalog of 60 illustrated pages describes elevator buckets, troughs, flights and other perforated articles made by the company from light and heavy steel plate. A mass of technical data relating to the methods of measuring perforations, as well as tables of sheet and plate steel gages, weights of sheet metals and other measurements, is given. The catalog is well indexed.

Recording Psychrometers.—Bristol Co., Waterbury, Conn. The recording psychrometers described in a 16-page catalog consist of two complete recording thermometer systems, including two sensitive bulbs and two penarms mounted together in one case and arranged to record on one chart. The catalog also contains a number of chart ranges with specimen scale for use with type instruments. A relative humidity table is published.

Power Plant Construction.—Morton C. Tuttle Co., Boston. Four-page folder illustrating work being done on the Kennebec River in Maine, adding 100,000 hp. to the power lines of the Central Maine Power Co.

Centralized Lubrication.—Lubrication Devices, Inc., Battle Creek, Mich. Booklet of 16 pages illustrating and describing the Farval positive centralized system of lubrication. Many of the illustrations are from applications in industry, and the showing is impressive as to diversity and also as to the sizes of some of the units served. Stress is laid upon the saving in labor of attendance.

Firebrick.—Laclede-Christy Clay Products Co., St. Louis. Four-page folder devoted to refractories and their production and handling in the plant of the manufacturer.

Flood Lights.—Crouse-Hinds Co., Syracuse, N. Y. Four-page folder on flood lights for a wide variety of uses. The housing is of cast aluminum alloy, said to be unaffected by salt atmospheres and incorrodible.